New York, Saturday, December 20, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

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Volume 64
Number 25

Hoover Safety Conference a Great Constructive Success

A FORCEFUL, constructive influence, looking toward early relief from the terrible toll of life in street and highway accidents, has been set in motion by the National Conference on Street and Highway Safety held in Washington Dec. 15 and 16. The conference on this pressing problem was called by the Secretary of Commerce, Herbert Hoover. He personally acted as chairman during a large part of the deliberations, and the masterful way in which the meetings were conducted and the high character of the work accomplished pay tribute to his great ability as organizer and doer.

It was no small matter to bring together representatives of the many interests concerned from practically every state in the Union, with all their conflicting and divergent views on the subject, and work out of this chaos in two days time a distinctly constructive statement of remedial measures having the whole-hearted approval of so large and representative a conference. It was something of an accomplishment even to get some of the interests together around a common table to discuss this problem. But the preliminary work done in eight committees, the expression of opinion on the committee reports at the first day's sessions, the harmonizing of the views expressed and the compilation of the various recommendations into a consolidated report, and then adoption of this report, section by section, by the whole conference on the second day, constitute a truly great accomplishment.

As finally approved, the recommendations of the conference form a program which all interests can indorse and apply. In some details, it may not satisfy one party or another, but it represents a point of view arrived at after long and careful deliberation by men of highest standing in their own industries and representing all interests concerned. The personnel of the committees and the backing of the federal government give the report a stamp of authority and distinction which should commend it to the careful consideration of all public officials, the railways, the automotive industry and all highway bodies and safety organizations. It will go a long way toward securing the uniformity of regulation and practice throughout the country so sadly lacking now, while avoiding federal regulation in the matter.

Chief among the recommendations of interest to interurban electric railways is that calling for legislative action requiring motor vehicles to come to a full stop at certain railway crossings and putting the responsibility in the hands of the state commissions to designate the grade crossings to which the law is to apply and so to mark them. The proposal of a stop law caused more debate than any other point raised. The railroads naturally want indorsement of the full-stop law without qualification. The final wording, however, is a sensible compromise. The plan adopted, if applied, will doubtless go a long way toward taking the burden of responsibility off the railways, and, what is far more important, toward material reduction in grade crossing accidents.

Street railways are also much concerned directly and indirectly with many of the provisions of the conference report. They will find that they can indorse and help along adoption of the whole program urged. The report is reviewed in another part of this issue, but electric railway men will do well to write to the Department of Commerce, Washington, for a copy of the complete report for study and application, and to support it in a broad way in their own communities.

Definite Limits of Wear Promote Good Maintenance

IN NEARLY all maintenance work the subject of economy is uppermost in the mind of the man in direct charge—and of his superiors also for that matter. Constant effort and attention is directed toward obtaining increased life from the various parts of the equipment without getting excessive road failures. At the same time it is desirable to get the work done at minimum labor cost.

Sometimes, however, the constant pressure for economy causes the ultimate result to be lost sight of when striving for immediate savings. There is a natural tendency in the attempt to get every possible mile of wear out of each part of the car equipment. The desire to "make a showing" in immediate costs may lead to badly run down equipment and poor service.

This shows up strikingly in connection with the replacement of bearings and similar parts that must be periodically renewed and that run into considerable cost. On many properties there seem to be no definitely established limits of wear, and it is questionable whether on many others that do have generally understood limits they are actually lived up to.

An important step toward better maintenance practice will be taken when maximum wear limits are definitely established for all important wearing parts and are then rigidly adhered to. Even though a limit is established and later found to be too high or too low, it can be readily altered and maintenance forces instructed accordingly. But some limit should be established, and when the part becomes worn to that point it should be taken out. In that way only can uniformly good results be obtained.

This is the issue in December that is devoted essentially to maintenance subjects

He Knew When It Was Time to Throw a Machine Away

THAT it very often pays to spend money in order to save money is illustrated by the experience of a master mechanic who recently replaced a still serviceable power-driven hacksaw by one of more modern design. When the suggestion that this be done was originally made to the management of the railway in question, it occasioned some surprise. At first thought it appeared to be an extravagance to throw away one fairly good saw and buy a new one.

But this master mechanic had made a study of machine tools, and he was ready with his argument. He showed the management just how money could be saved by installing a better machine. In this case the better machine was primarily a quicker machine, and at present rates of wages any machine that saves time will soon pay for itself. So, he argued, instead of being an extravagance to install a new machine, it would really be an economy.

The management of this railway is always on the lookout for ways of legitimately reducing expenses. Moreover, the master mechanic was known to be a man with long experience at his work and having sound common sense. So a new high-speed saw was bought and installed in the shop. Its performance soon justified the expense. For example, it reduced the time required to cut through a steel axle to one-tenth the former time. The life of the saw blades was practically quadrupled.

Opportunities to make changes of this kind exist in nearly every railway shop. For thus being able to visualize the possible savings to be effected by throwing away an old machine this master mechanic deserves great credit. Equal credit is deserved by the management which listened with an open mind to his argument and was willing to put the proposal to the test.

Riding Comfort May Have a Stronger Appeal than Cheapness

DRIVING down by automobile from the house to the office is a pretty cold proposition these winter mornings. The wind howls and the snow sifts in through every small opening. An icy covering makes the pavement treacherous. If the old bus stands parked all day and gets snowed in, it may require a half hour's delay and use up the best robe under the wheels to get backed out and headed homeward. On the other hand, riding in the street car is comfortable and warm and safe and convenient.

An appeal to the automobile driver based on some such argument as the foregoing is likely to be effective at this season of the year. This idea was tersely put by Labert St. Clair in a telegram to the Pennsylvania Street Railway Association Convention at Harrisburg on Dec. 5, which was reported in this paper last week. In it he said, "Make the comfort of street car riding rather than the cost of running an automobile the basis of appeal to automobile owners."

That does not mean, of course, that the well-known slogan "Ride the street car and save the difference" is not effective. Its value has been proved by experience in many places and undoubtedly it has influenced a large number of people to ride the railway. But the average American automobile owner is more influenced by comfort and convenience than by cost. He will spend money freely to get what he wants. If he can be convinced that it is more convenient and comfortable for him to ride downtown in the street car than it is to get his automobile out of the garage and drive down, that is more apt to appeal to him than the fact that he is saving 10 or 15 or 50 cents.

Then, too, the economy argument is no longer new to the public in some cities, and novelty is one of the most important requirements of effective advertising. Skillfully worded publicity emphasizing the comfort feature might be more effective now than that which stresses primarily the cheapness of riding the street car.

A Subway Is an Expensive Luxury

IT IS a striking fact that in nearly every large city in the country there is a tremendous demand for subways. This applies notably to the two largest cities, New York and Chicago, but in Detroit, Philadelphia, St. Louis and other cities subway construction, or additions to the present systems, is being strongly advocated by many citizens.

This desire is understandable with the congestion of traffic on the surface of the streets, but the public should realize that subways are a very expensive luxury and that the cost of building them, like the price of many other desirable things, has gone up greatly during the past 10 years. This is shown in the estimated cost figures given out last week in New York for the Mayor's proposed subway between the southerly end of Manhattan and 193d Street. For one of the downtown sections of this line—0.83 route-miles in length—the cost is estimated at more than $25,000,000 per route-mile and the figure for the entire length of the division south of 64th Street—10 route-miles—is given as $114,000,000. This amounts to $11,400,000 per route-mile. Part of this section is two-track, part four-track and part six-track, there being 36.32 track-miles to the 10 miles of route. These cost figures are exclusive of all equipment or of shops, or of any land or easements.

For the section north of 64th Street and as far as 193d Street, the cost on the same basis is estimated at about $8,040,000 per mile of route, there being 6.65 route-miles and 24.95 track-miles. The reduction in these figures from those for the downtown section is due, of course, to less arduous conditions of construction.

Some of the factors which have an important bearing on the cost of building subways are narrow streets with high buildings, especially where this condition is combined with soft subsoil, extent of other substructures in the street, whether the subway is under water level, and the extent of the street congestion over the proposed construction. The latter condition affects the cost of receiving materials and the disposal of the refuse.

Most of these factors are present to some extent in the 0.83-mile downtown section of Manhattan, where the proposed line would have to cross under two subways of the Interborough Rapid Transit Company and one of the Brooklyn-Manhattan Transit Corporation, where much underpinning of these and other structures would have to be done, and where there is not much room for carrying on the work. Above 64th Street, conditions for construction are more favorable and this fact is reflected in the price. But, in general, it may be said that the cost of subway construction has considerably more than doubled since 15 years ago, when a rough estimate for the building of a two or four-track subway was $1,000,000 per single track mile.

Jigs and Dies to Reduce Shop Costs

Chicago Surface Lines Uses Special Tools to Make Many Parts in Punch Presses—These Formerly Required Several Hand Operations—Automatic Stripping and Ejection of the Finished Parts Speeds Up Production

IN THE West Shops of the Chicago Surface Lines many dies and jigs have been developed to hold down the cost of making replacement parts for car equipment. As a result, the number of hand operations has been reduced to a large extent and the punch press has been substituted for hammer, saw, file and drill press. These special tools have been made up from time to time over a number of years, the high wage scales prevalent in Chicago being an added incentive. Although many different types have thus been developed, each expenditure for new dies is carefully supervised and the cost of a proposed new tool is compared with the estimated saving to be made before the work is authorized.

An endeavor is made to avoid the tendency in railway maintenance practice of manufacturing parts that can be purchased cheaper from other sources. In some cases, however, the decision is determined by the time element in delivery. Special parts that are required in comparatively small quantities frequently cannot be purchased at an attractive price except in large lots. Consequently the cost of carrying large stocks of such parts sometimes makes it desirable to manufacture them in the shop. Since punch press dies can be set up quickly in the machines, it is possible to manufacture comparatively small lots of special parts at prices that more than justify the cost of making up the dies.

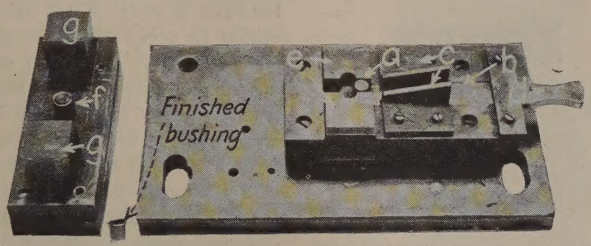


Fig. 1. Die for Rolling Bead on Push-Button Bushings

The pieces are stripped by pulling the handle at the right, which causes the bead on the bushing to engage the inclined surfaces at (*a*).

The punch press equipment available was originally purchased for maintenance purposes and is not particularly suited to quantity production. It consists mostly of comparatively slow, heavy-duty machines. With the exception of one motor-driven V. & O. Press Company No. 21 punch, these are limited to a Williams, White & Company No. 14 press, a Long & Allstatter combined punch and shear and one other heavy-duty, deep-throat punch. The various types of dies and jigs that have been designed increase the service obtained from these machines. Since there is nothing unusual about the machine equipment available in these shops, the tools to be described are of types that can be utilized with the machines found in most railway shops.

In the accompanying illustration, Fig. 1, is shown a die for making push-button bushings for the passenger signal bells on a comparatively large group of cars. This particular type of signal is no longer on the market, and repair parts are therefore not available from the original manufacturer.

The bushings are made of thin brass tubing, with a bead rolled on one end to protect the passengers' fingers. They are first cut off in a screw machine and the bead is then rolled by the punch and die shown in the illustration. The piece of tubing of proper length is slipped on the pin (*a*) projecting from the sliding member (*b*) shown in the illustration. This slide extends out to the right from the body of the die to form a handle at (*d*) which can be grasped by the operator. When the slide is pulled out to the extreme right the pin (*a*) is exposed so that the piece of tubing can be readily dropped into place. The sliding member is then pushed to the left until it strikes a stop. This places the bushing between the two halves of the split forming die (*e*), shown open in the illustration. This is held open by compression springs and is arranged so that the two halves of the die are free to slide in the die block. When the punch, shown at the left, descends, the two heavy lugs (*g*) engage tapered outer faces on the split die (*e*), and as the punch comes down into position the two halves of the die are brought together so as to clamp securely the bushing between them. The top of the bushing is rolled by the punch (*f*) in the center. When the punch is raised from the die the two split members are forced apart by the compression springs mounted between them, thus releasing the bushing and the hand-operated slide (*b*) so that the latter can be pulled to the right by hand. When this is done the newly rolled bead on the top of the bushing engages the two inclined surfaces (*c*), and as the sliding member continues toward the right the bushing is automatically drawn off the pin, so that another piece of tubing can be quickly dropped in place, and the operation repeated. This job is carried out on a V. & O. Press Company No. 21 motor-driven punch at the rate of approximately 2,000 pieces per hour.

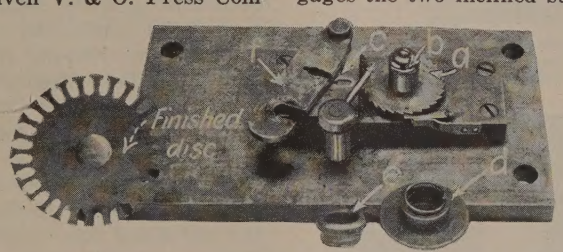


Fig. 2. Equally Spaced Slots in Fish Paper Insulating Disks for Fan Motor Armatures Are Cut in This Indexing Die

A good example of an indexing die for making a number of equally spaced cuts in a single piece of material is shown in Fig. 2. This is used for cutting the slots in the circular fish paper insulation used in small ventilating fan motor armatures.

The round disks are first blanked out of sheet material. The slots for the windings are then cut in the

die shown. A disk is slipped over the spindle (*b*) and the guard (*f*) is fastened in place to act as a stripper. The collar (*d*) is then slipped on the spindle (*b*) and the cap (*e*) is placed on top. This cap is provided with a projecting pin on the inside which enters the vertical slot near the top of the spindle (*b*). By pressing down on this cap the spring inside the collar (*d*) is compressed. The cap (*e*) is then given a partial turn so that its pin engages the circumferential slot shown near the top of the spindle (*b*), thus holding the collar (*d*) securely in place and clamping the disk of fish paper on the ratchet wheel (*a*). The various parts just described are all clamped together through the action of the spring inside the collar (*d*), but are free to rotate about the vertical pin in the center of the spindle (*b*). A spring engaging the notches in the ratchet (*a*) allows it to be rotated by hand, one notch at a time, corresponding with the spacing of the slots to be punched in the disk. As the piece is rotated, it is thus indexed to give the required number and spacing of slots. The work is done in a Williams, White & Company No. 14 power punch press at the rate of 25 complete disks per hour.

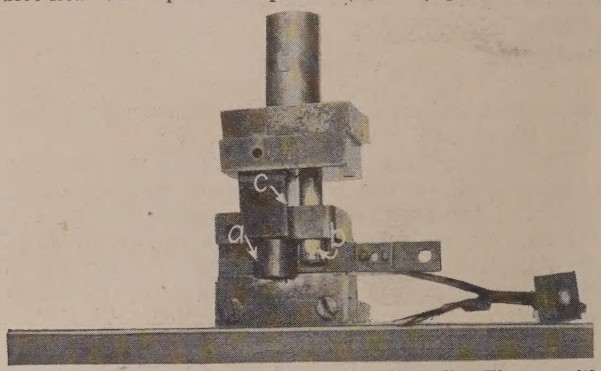


Fig. 3. Burning Tips Are Removed from Controller Fingers with This Equipment, Which Holds the Finger in Place While the Punch Shears Off the Worn Tip

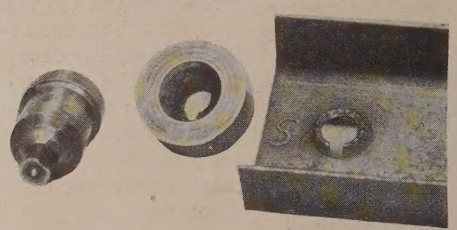


Fig. 4. Holes in Truck Pedestal Wear Channels Are Punched and Slotted at One Time with This Simple Equipment

A punch and die for the removal of burning tips on controller fingers offers an excellent example of the substitution of machine for hand operations in salvaging worn parts. This tool, shown in Fig. 3, is designed so that a projecting pin (*b*) on the punch passes through a hole in the die block to hold the finger securely in place while the punch (*c*) cuts off the burning tip (*a*). The condition of the two parts after the tip has been removed is shown at the right side of the illustration. The finger is then ready for a new tip. This work is done in the V. & O. Press Company No. 21 punch press at the rate of about 2,000 pieces per hour.

The simple punch and die shown in Fig. 4 is used to make countersunk slotted holes in 4-in. structural channel wear pieces for truck pedestal jaws. On this particular type of truck the wear pieces are held in place with countersunk head carriage bolts which have a lug at one side to prevent the head of the bolt from turning while the nut is being pulled up tight. As will be seen from the illustration, the punch not only cuts and countersinks the hole, but also forms the slot to take the projecting lug on the carriage bolt. This work is done on a heavy-duty power punch press at the rate of about 200 holes per hour.

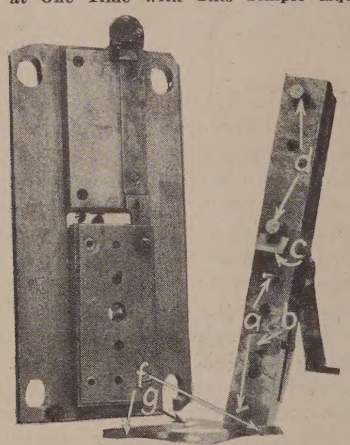


Fig. 5. Car Ribbon Fuses Are Made by a Continuous Process
The two pieces of ribbon are fastened together, the center calibrating hole is punched and the finished fuses are cut to the proper length.

Car Ribbon Fuses Made Complete

In Fig. 5 is shown an ingenious die for making car ribbon fuses from thin strips of copper. The copper ribbon is purchased in rolls 1 in. wide and 0.005 in. thick. Two of these thicknesses of material are fastened together and a calibrating hole is punched in the center, to form the complete fuse, as shown at the bottom of the illustration. This has been pulled apart to show the two ribbons of copper. The entire operation of making these fuses is completed in the die shown, as a continuous process. The two ribbons of material are fed into the die from two different rolls. The projecting prongs (*a*) on the die pierce the two strips of copper in such a manner as to leave a projecting burr at two points spaced so they will come near each end of the completed fuse. At the same time the center hole (*g*) is punched in the ribbon. As the material is pushed forward again in the die, against a stop which fixes the proper length, the two projecting punches (*d*) flatten the burrs that were made at (*f*) so as to fasten the two pieces securely together. At the same time the descending cutter (*c*) cuts the completed fuse off to the proper length. The operation is then again repeated. This work is done in the V. & O. Press Company No. 21 press at the rate of about 3,500 complete fuses per hour.

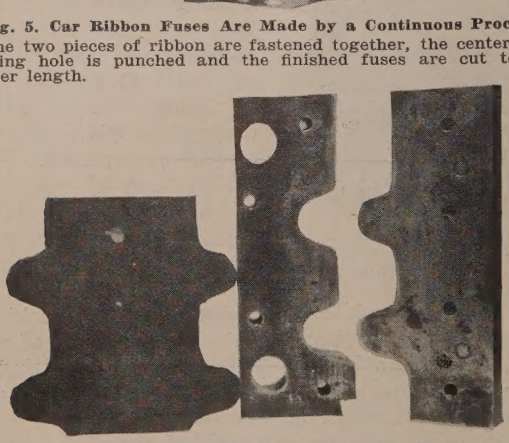


Fig. 6. Case-Hardened Wear Plates Are Bolted to Projecting Ears on Journal Boxes. The Pieces Are Cut to Proper Shape in a Punch Press

A heavy cutting die for blanking out the irregular-

shaped journal box wearing pieces shown in Fig. 6 is used in a Williams, White & Company No. 14 press. In this case it is necessary to make two cuts to complete the work, the piece being turned around after the cut on one side has been made. The material is $\frac{5}{16}$-in. sheet steel and is later formed and punched to complete the wearing pieces. These are made up so that they can be bolted to projecting ears cast on the sides of the journal boxes. The jig for punching the holes in the ears after the piece has been formed is shown in Fig. 7. This is of interest chiefly because of the complicated shape of the piece to be punched. It will also be noted that several sets of holes in the jig permit it to be used for punching wear plates for different-sized journal boxes.

Several Types of Forming Dies Used

Two forming dies of widely different types are illustrated in Figs. 8 and 9. The one shown in Fig. 8 is used for the manufacture of the small eye-bolts shown at the bottom of the illustration. This is part of the car fuse box assembly and is made up cold from $\frac{5}{16}$-in. round, cold rolled steel. The pieces are sheared to the proper length and are then formed in four operations. The successive stages of the forming are carried out in order on the four sections of the die marked, respectively, (*a*), (*b*), (*c*) and (*d*). The piece is moved from one position to the other in the die so that it requires four movements of the press to complete the operation. In the first position (*a*) the rod is kinked up at one end. In position (*b*) this kink is depressed so as to bring the stem approximately at the center of the loop. In positions (*c*) and (*d*) the loop is finally completed. The work is done in a Williams, White & Company No. 14 press at the rate of 75 pieces an hour.

Brass channel wearing pieces used to reinforce the stiles of body sash are formed from No. 18 gage strips of the proper width in the punch and die shown in Fig. 9. The completed channel is shown at (*c*) in the illustration. The punch and die shown are used to form the channel only, the screw holes and cuts for the sash locks being made in a second die that is not shown. In the Williams, White & Company No. 14 press these are formed at the rate of approximately 40 per hour.

An excellent example of a die which substitutes punching operations for what would ordinarily be a drill press job is illustrated in Fig. 10. The large holes in the channels that are used as wear pieces on truck pedestals are punched instead of being drilled. The block (*b*) in the die supports the web of the channel so that it can be punched without distorting the flanges. These channel pieces are also sheared to the proper length in a similar die designed to support the piece, so that both the web and the flanges are cut off clean. Both 14-in. and 16-in. lengths of channel are required for different types of trucks, and an adjustable pin at the left of the die shown in Fig. 10 enables the same die to be used for punching pieces of either length. The punching is done in the Williams, White & Company No. 14 press at the rate of 60 pieces per hour.

Die Locates Holes from Center Punch Marks

In most railway shops the punching equipment is not suitable for making a number of holes in small structural members which have been laid out with center punch marks. This is due to the fact that such punch press equipment is usually of the rotating type, on which the punch stops in a raised position, making it difficult to locate the center punch so that the hole will be in exactly the proper position. The device shown in Fig. 11 was designed to make an ordinary punch press suitable for such work. When set up in the machine the end of the pointer (*a*) corresponds

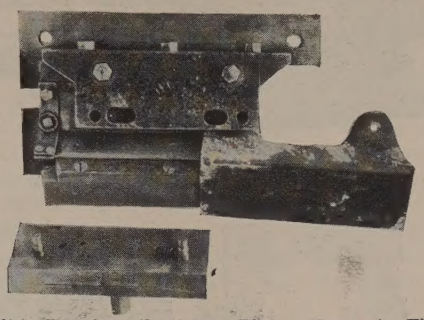


Fig. 7. After Forming, the Wear Plates Shown in Fig. 6 Are Punched in This Jig

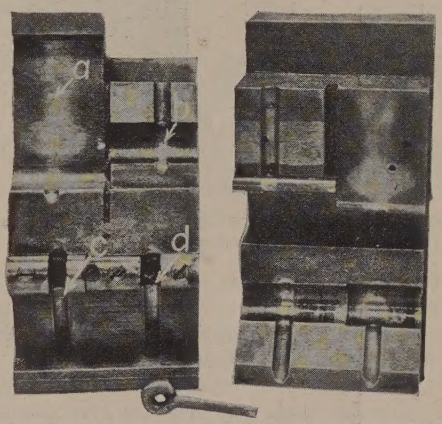


Fig. 8. The Piece Shown at the Bottom Is Formed Cold from 5/16-in. Round Stock in Four Operations

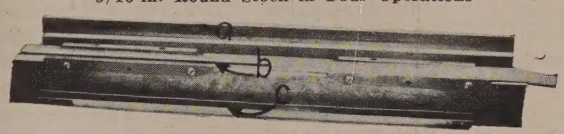


Fig. 9. This Die and Punch Are Used for Forming Brass Sash Channels from No. 18 Gage Material

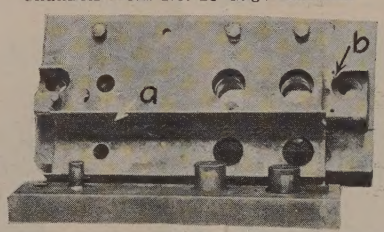


Fig. 10. Die for Punching the Large Holes in Webs of Truck Pedestal Channel Wear Pieces at a Substantial Saving Over Cost of Drilling

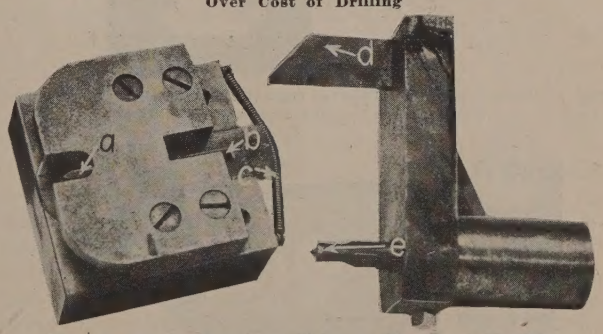


Fig. 11. Die for Punching Holes in Structural Members

The difficulty of working from center punch marks when using an ordinary type rotating press is overcome with this ingenious die, which contains a pointer for locating the position of the hole. The pointer is forced aside as the punch descends and returns to position when the punch is raised from the work.

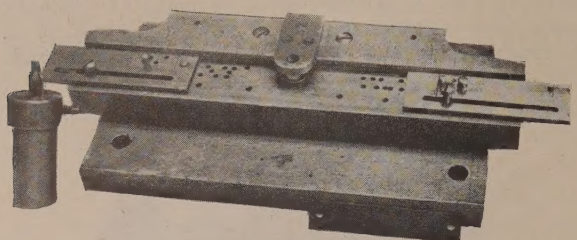


Fig. 12. The Holes in Various Types of Controller Cylinder Segments Are Located in This Adjustable Jig

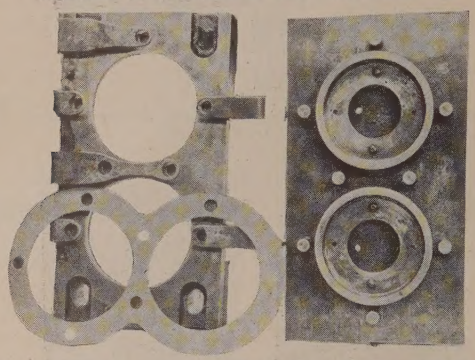


Fig. 13. Compressor Cylinder Head Gaskets Are Punched from Several Thicknesses of Material

exactly with the center line of the punch (*e*). When the work is moved, so that the end of this pointer coincides with the center punch mark locating the hole to be made, the punch itself will descend in the proper position. The pointer in the die is carried on the end of a cross slide having a slot near the rear end at (*b*). This slide is normally held in the forward position against a stop by the spring (*c*) which is stretched across the back of the die, and presses against the slide. A wedge (*d*) carried on an extension back of the punch enters the slot (*b*) as the punch descends and forces the slide back so as to move the pointer out of the way while the hole is being made in the material. As soon as the punch is again raised the pointer (*a*) returns to its normal position and is ready to locate the next hole.

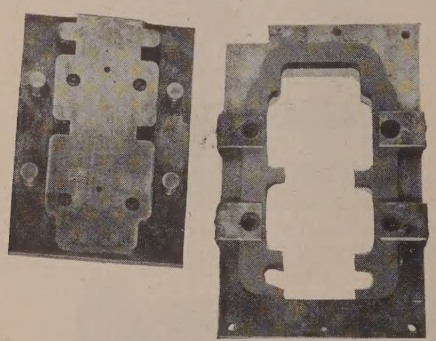


Fig. 14. This Is Another Type of Gasket Die, Which Is Similar in Construction to that Shown in Fig. 13

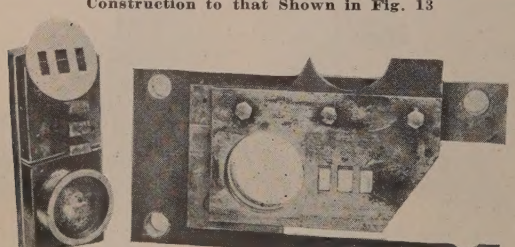


Fig. 15. Engineer's Valve Gaskets Are Punched from Sheet Material in a Continuous Process. The Punch Is Made in Two Parts So that Each May Be Used Separately if Desired

To make up different dies or jigs for each of a large number of similar parts which vary slightly in size and position of holes becomes a very expensive matter. In Fig. 12 is illustrated an adjustable jig which is indexed so that a comparatively large number of similar parts of varying dimensions may be all punched on the same piece of equipment. This is used for punching the holes in controller cylinder segments before they are formed. Pins in the slides at each side of the jig are dropped into holes corresponding to the positions indicated by the various scales which are laid out to locate the holes for various types of controllers. In this one jig all the various plates used on K-51, K-35 and K-28 controller cylinders are punched. The hole at each end of the piece is punched separately, the right and left hand sides being adjusted so that the piece is moved first to one side and then to the other. The work is done at the rate of about 1,000 pieces per hour in the V. & O. Press Company No. 21 power punch press.

Three different dies for punching gaskets are illustrated in Figs. 13, 14 and 15. The one shown in Fig. 13 is used to punch the bolt holes and the inside contour for compressor cylinder head gaskets after they have been blanked out on another die. That shown in Fig. 14 is very similar and is used for the outside cylinder

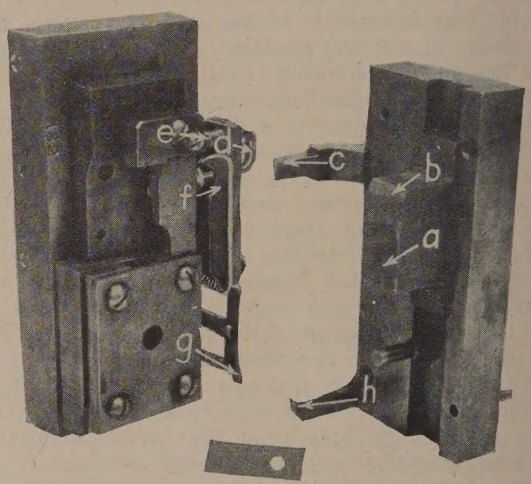


Fig. 16. The Controller Finger Part Shown at Bottom Is Punched and Formed from Brass Strips of Proper Width. An Ejecting Device Removes Finished Piece as Punch Is Raised

head gasket. The equipment in Fig. 15 punches engineer's valve gaskets from strips of material in a continuous process. The three rectangular holes are punched in the piece first and the gasket is then blanked out on the second descent of the punch, while at the same time the holes for the next gasket are being made. The punch is made in two parts so that one or the other part may be removed and the tool used for either operation separately. All three of the dies shown in Figs. 13, 14 and 15 are used on the V. & O. Press Company No. 21 punch press. The cylinder gaskets are made at the rate of about 500 per hour by using several thicknesses of material at a time, while the engineer's valve gaskets are turned out at the rate of approximately 3,500 per hour.

In Fig. 16 is shown an ingenious arrangement for ejecting a small piece of work after it has been punched out and formed. By thus automatically ejecting the completed pieces the production is very materially increased, as the material is fed in continuously and the

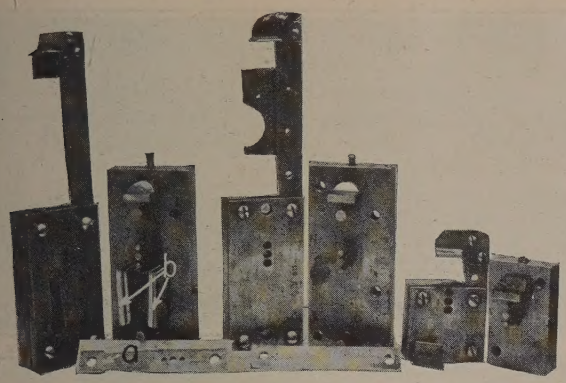


Fig. 17. Several Types of Forming and Punching Dies Are Used for Making the Various Parts of Controller Fingers

press operated at top speed. The part manufactured consists of a small brass strip, slightly curved at one end and having a hole punched near the other end, as shown near the bottom of the illustration. This is one of the pieces making up a controller finger assembly and is manufactured from strip brass of the proper width and thickness.

As the material is fed into the die the hole is punched first and the piece is then cut off to the proper length and formed to the proper shape while the hole is being punched for the next piece. The cutting edge is at (*a*) and the forming die at (*b*). After forming, the completed piece is left in the bottom of the die and it is necessary to eject this before the next piece is cut off. As the punch descends, the finger (*c*) enters the opening at (*d*) to force the U-shaped ejector out of the way of the forming punch (*b*). As this ejector is moved back the small spring (*e*) is compressed and the latch (*f*) drops into a notch, thus holding the ejector back in position. While the above action is taking place the hook (*h*) slips below the secondary latch (*g*). The piece of work, in the meantime, has been cut off and formed and lies in the bottom of the die. As the punch ascends again the hook (*h*) trips in turn the secondary latch (*g*) and the latch (*f*), releasing the ejector (*d*), which, under the action of the spring (*e*), snaps the completed piece out of the bottom of the die. The operation is repeated as the punch descends on each stroke. These pieces are made at the rate of 3,000 per hour in the V. & O. Press Company No. 21 press.

A group of three dies used for forming the various parts of K-35 controller fingers from strip brass and bronze is shown in Fig. 17. The completed pieces are illustrated at the bottom of the illustration. In addition to cutting off and punching, the die at the left also cuts the outside contour of the piece to the proper shape as shown at (*a*). This cut is made by the cutting edges (*b*) on the punch at the same time that the holes are being made. All of these parts are made continuously from strips of material fed into the dies and a production of approximately 3,000 per hour is obtained in the V. & O. Press Company No. 21 press.

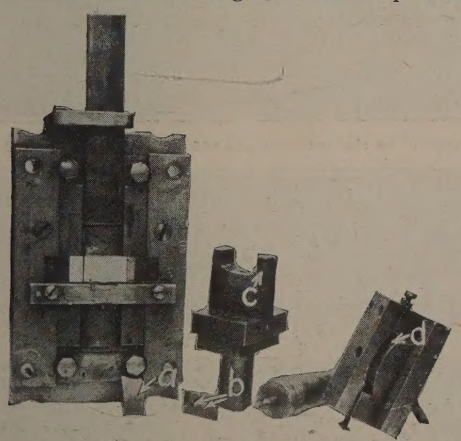


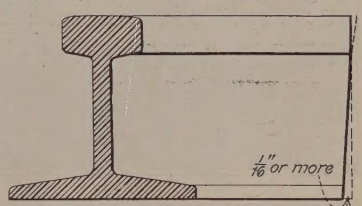
Fig. 18. Short Controller Segments Are Sheared from Formed Copper Bars and Holes Are Punched Radially in Die Shown at Right

Short controller cylinder segments are cut with the equipment shown in Fig. 18 from copper bar formed to the proper contour. The pieces for the segments are sheared from the formed bar with the punch and die shown at the left of the illustration. At the right is an interesting type of die used for punching the two holes in these pieces. The holes must be radial rather than parallel, and in order to accomplish this the piece is moved first to one side and then to the other in the curved slot in the die.

Keeping Rail Ends in Contact

Milling in a Plane Perpendicular to the Longitudinal Axis, and Undercutting the Web and Base to Produce Better Joints

EXPERIENCE has shown that in order to avoid having open joints at the running surface of the rail head, it is frequently necessary slightly to undercut the end of each rail. Otherwise, variations in the accuracy of the cutting of the rails, or in the grade or alignment of the track, may cause the rails to touch at the bottom and be open at the top. If rails are undercut in this manner, however, and the top edges only are in contact, then when wear takes place, the rail ends are no longer in contact.

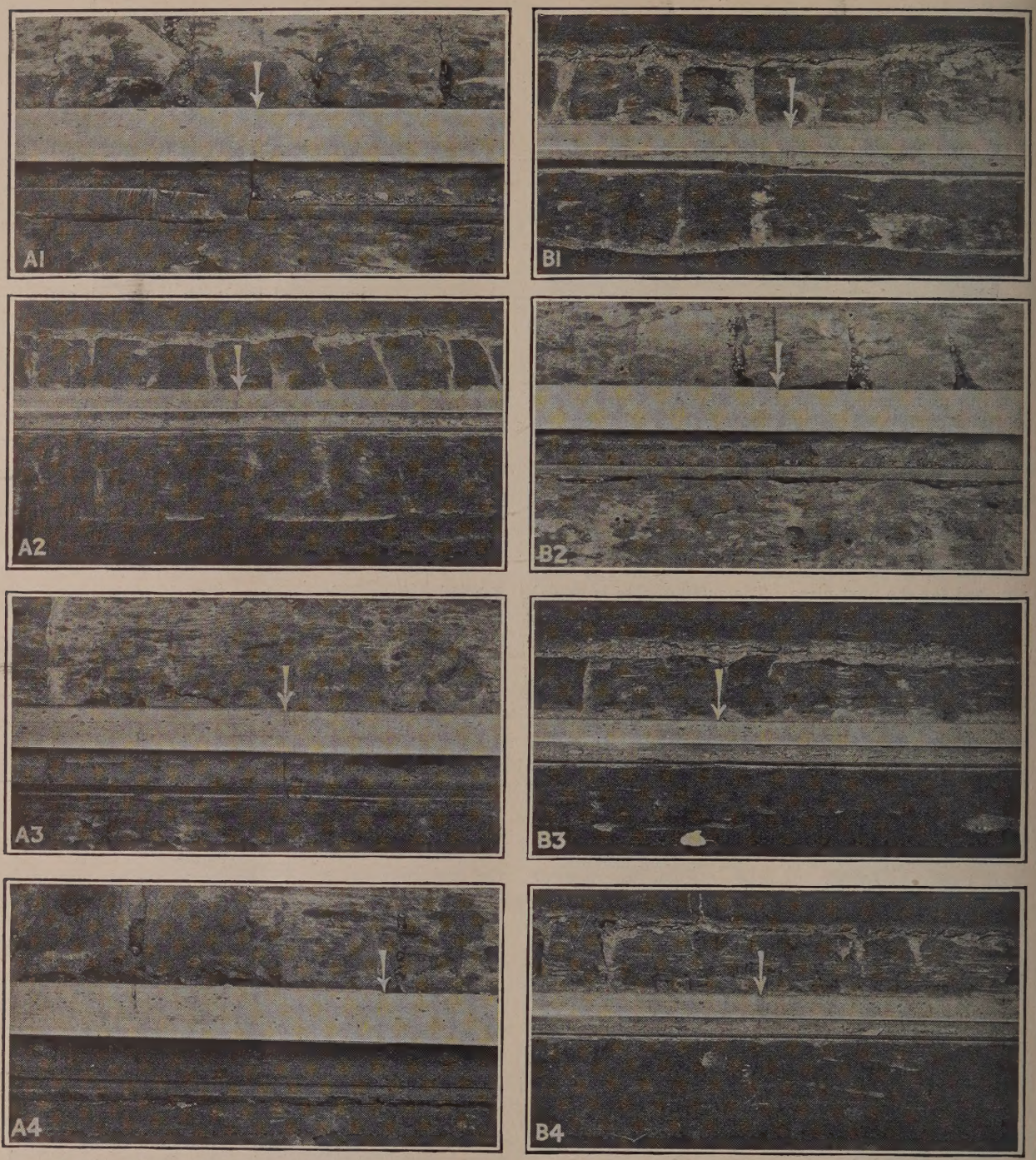


Method Developed by Third Avenue Railway for Finishing Rail Ends

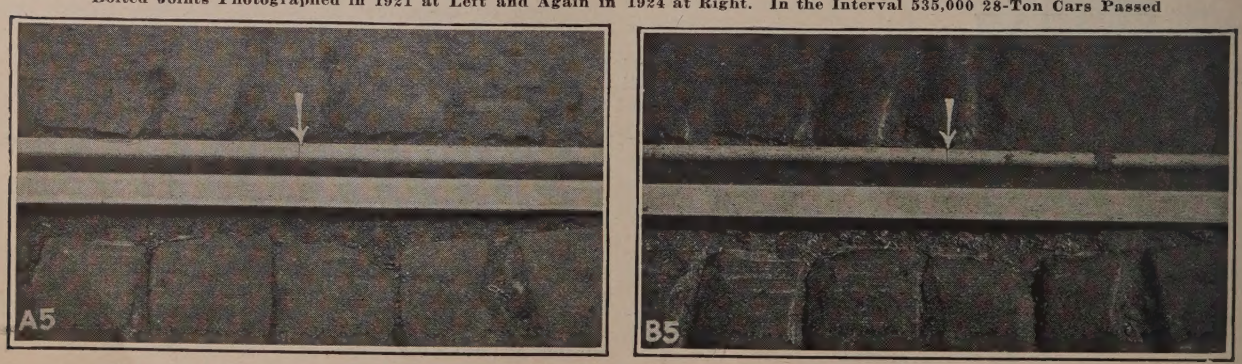
To overcome this difficulty a special method of finishing the rail end has been designed by E. M. T. Ryder, way engineer Third Avenue Railway. According to his plan the end of the rail is undercut, preferably to a greater extent than in standard practice. The head of the rail is then milled or otherwise cut to a plane which is perpendicular to the longitudinal axis of the rail. The ends of the heads of two adjacent rails are brought into contact, and as the area in contact is only 1 in. or 1½ in. in depth, and about one-sixth the depth of the rail, a slight variation, either due to error in cutting or grade or alignment in laying the rail, would be negligible, and the heads of adjacent rails would still be in substantial contact throughout.

In fact, variation in width of the head and lip would be more likely to be material than would variation in depth. Such variation in the width, however, can to a considerable extent be taken care of during the operation of laying the track, as a saw cut can be made between the lips of the adjacent rails if necessary, or between the outsides of the heads, thus leaving a limited area at the end of one rail which is in contact with the corresponding area of the adjacent rail.

A patent has been granted Mr. Ryder covering this method of finishing rails.



Bolted Joints Photographed in 1921 at Left and Again in 1924 at Right. In the Interval 535,000 28-Ton Cars Passed



Between the Dates of the Pictures at Left and Right 136,000 Cars, Weighing 26 Tons, Passed Over This Joint

Experience with Bolted Joints in San Francisco

Among 16,000 Joints of This Type Installed by the Market Street Railway During the Past 13 Years the Only Failures Have Been a Few Broken Rail Ends—Redwood Ties on Rock Ballast Are Used with Concrete Stringers Under the Rails

SINCE 1911 the Market Street Railway, San Francisco, Cal., has been making extensive use of bolted track joints. Among more than 16,000 such joints that have been installed the only failures during this period have been the breaking of 16 rails through the bolt holes. The track structure is of the ordinary type, in which rock ballast and wood ties are used, but special care is exercised in making the joints. Subsoil conditions vary widely in different parts of the city, ranging all the way from soft mud to rock.

In the lower business district the land has all been made artificially by filling in the shallow parts of the bay. The soil underneath the fill is a peculiar soft mud, and in many places it settles at a rate of about 0.1 ft. per year. Reference to this was made in an article published in ELECTRIC RAILWAY JOURNAL, issue of Dec. 23, 1922. This layer of mud is often as much as 300 ft. in thickness, and no matter what type of track construction is used both it and the entire street settle at a more or less uniform rate.

Outside the area of made land, which extends about ½ mile back from the waterfront, the subsoil is sandy in many places. In other districts, a soft shaly rock is found. Adobe loam and ordinary silty loam are present in certain localities.

Where any kind of rock is present the railway uses only enough ballast to be able to tamp thoroughly. In all other cases 9 in. of crushed stone ballast is placed under the ties. The latter are of redwood, 6 in. x 8 in. x 8 ft., spaced on 2-ft. centers. Rails are Lorain Steel Company section 106-422 and section 121-519. Round 1-in. tie rods are placed 8 ft. apart. The rails are spiked to the ties and in some cases tie plates are used.

A concrete stringer between the ties supports the rail. Concrete is used also as a paving base. On some streets 8-in. stone blocks are laid at right angles to the rail on top of this base. Elsewhere the blocks are omitted, the concrete is brought to a higher level and topped by a 2½-in. coating of asphalt.

The standard joint now being installed has two Lorain bridge type splice bars for 9-in. rail. These are held in place by 12 bolts of 1-in. diameter. All joints are installed by the same crew, consisting of a foreman, who has been in the employ of the railway for many years, and three or four other men. The head bonder has also had long experience at this work, and the remaining men are laborers who have been trained to install joints and do nothing else.

Brazed concealed bonds are first installed. Before fastening the plates, the rails are butted together as closely as possible. Then the plates are put on and bolted, six of the bolts being inserted from one side of the rail and six from the other side. In tightening them sledgehammers are used on the heads and on the plates to drive the latter in to make a perfect fit. In this way, if there is a slight inequality in the fishing sections of the rail, the plate is driven in and made to fit the inequality. The bolts are then tightened again by means of a long-handled wrench.

Cars are permitted to run over the new joints and for several days after the first installation the track gang is kept busy tightening the bolts. This is done five or six times and is repeated immediately before the street is paved, so as to insure that all bolts are snug before concrete is placed around the plates. The head of the rail is then planed with a Vixen planer, so that there shall be no unevenness in the running surface. In a comparatively short time after the rail has been planed and placed in service there is nothing to show the existence of the joint except on the flange side, which has not been affected by wheel passage

With joints constructed in this way, the railway believes that there is little chance of cupping. If cupping should develop, however, the joints are immediately ground smooth. It is thought that cupping at the joints loosens the bolts rather than that loosening of the bolts causes cupping. Experience in San Francisco indicates that so long as proper attention is given to keeping the rail head smooth the bolts do not become loose.

Traffic is extremely heavy on a number of lines where these bolted joints are used, the rush-hour headway being as short as 10 seconds. On other lines, the traffic is not so heavy, but only in a few cases is the headway as long as 5 minutes.

The accompanying illustrations show a number of joints after being subjected to varying amounts of service. No. A-1 to A-4 were taken on Mission Street in the summer of 1921, after the track had been in service about a year. At that time approximately 155,000 cars weighing 28 tons empty had passed over this track. The same joints were photographed again in September, 1924, as shown in No. B-1 to B-4, after 690,000 car passes.

A joint installed in April, 1916, near the intersection of Folsom and Second Streets was photographed on April 7, 1921, as shown in illustration A-5, after the passage of 210,000 cars weighing 26 tons each. When the second photograph B-5 was taken in September, 1924, the joint had had 346,000 car passes.

So far, it has been necessary to grind down the joints on only a few lines, and in these cases the joints had been made from 10 to 14 years ago and had not been planed at the time of their original installation. Since the Market Street Railway has been using the present standard bolted joints, there have been 16 failures due to broken rail ends. In all of these cases it was discovered that there had been a crack in the rail through the bolt holes. Except in these instances, it has not been necessary to open up any of the joints, either to tighten the bolts or to insert a section of new rail.

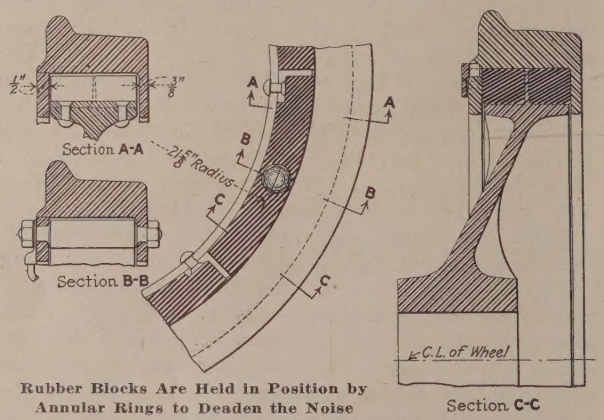
Cushion Wheels Tested to Reduce Noise

Rubber Insulated Rims Are Being Tried Out in Oil City, Pa.—The Results So Far Secured Have Been Encouraging

BY JOHN A. DEWHURST
Day & Zimmermann, Inc., Engineers, Philadelphia, Pa.

THE desirability of eliminating noises in street car operation was emphasized in the report of the 1923 American Electric Railway Engineering Association committee on car design. With this end in view, a trial set of cushion wheels has been put in operation on the lines of the Citizens Traction Company at Oil City, Pa., and is now on test on one of the standard safety cars.

This type of wheel has been in use in gasoline rail-car construction for about 3 years, but to the knowledge of the writer this is the first application of this type of wheel to an electric car. The early observations indicate that, while the noise is not reduced to a minimum, the cushion wheels have materially helped to deaden the sound of the rail and wheel contact.



Rubber Blocks Are Held in Position by Annular Rings to Deaden the Noise in This Cushion Car Wheel

One of the most unfavorable points of comparison between the electric car and almost any form of automobile transportation is that of noise. Even a perfect steel wheel rolling against a perfect steel rail will produce a certain amount of noise that cannot be avoided. Add to this condition a little dirt on the track, a few loose joints, or a rail that is partially scored or worn, and the noise is very greatly increased. However, the noise produced between the wheel and the rail is not the only source which exists in street car operation. Loose brake rigging, the action of brakeshoes against the steel wheels and worn gears will add materially to this unpleasant feature and oftentimes produce a very irritating condition. The general public is so used to the noise accompanying street car operation, especially on hard paved streets, that it sometimes does not arouse as much criticism as in many cases is warranted.

The accompanying illustration shows the construction of the cushion wheel, which is designed to reduce the amount of noise occasioned by the ordinary electric car operation over the average track. The wheel has a cast-steel hub which is machined exactly as is the hub of a rolled-steel wheel and is pressed on the axle. The periphery of this cast-steel center, as shown in the diagram, is machined to contain a set of rubber cushions, one set placed on either side of the center web in blocks about 8 in. long around the entire wheel. The rolled-steel tire is then pressed on with a light pressure, being held firmly in place by the through bolts.

When the steel rim is in place, it rests snugly against the rubber inserts, but the steel flange on either side does not quite come in contact with the cast-steel center, there being a space of about $\frac{1}{16}$ in. The through bolts are really a part of the rolled-steel rim and do not come in contact with the steel center but hold the steel rim in place through the agency of the center web cast on the wheel center.

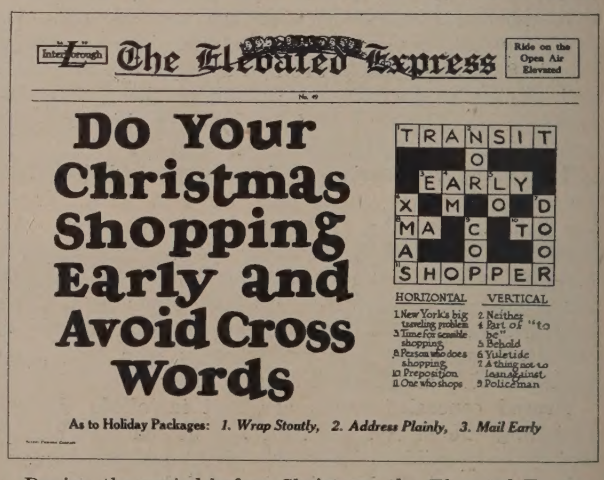
The driving action of the motor is transmitted through the cast-steel center and into the rim through the agency of short angles, which are riveted to the steel center and rest against the ends of the rubber blocks, the driving action passing lengthwise through the rubber blocks to the bolts and hence to the steel rim. Under extreme conditions for this type of car, the pressure passing through the rubber does not exceed 100 lb. for each bolt. The rolled-steel rim is so thoroughly insulated from the steel center that it is necessary to use a flexible copper bond between the two elements of the wheel in order to complete the return circuit to the rail.

The rubber inserts are constructed especially for this purpose and are of a very high-grade, soft, pliable gum rubber, similar in general composition to the rubber inserts used in the Mead cushion wheels; in fact, they are manufactured by this concern.

Besides the noise-reducing qualities of this type of wheel, it is expected that the slight give of the steel rim with respect to the wheel center will tend to reduce very materially the flange wear in special work occasioned in going around curves of short radius. If the wheel flange wear is reduced by this means, it also follows that the rail wear should be reduced on curves and in special work likewise.

Besides this test at Oil City, there is also a set about to be put in operation in Zanesville, Ohio. An additional set for a double-truck car is being constructed for the York Railways at York, Pa.

How to Avoid Cross Words

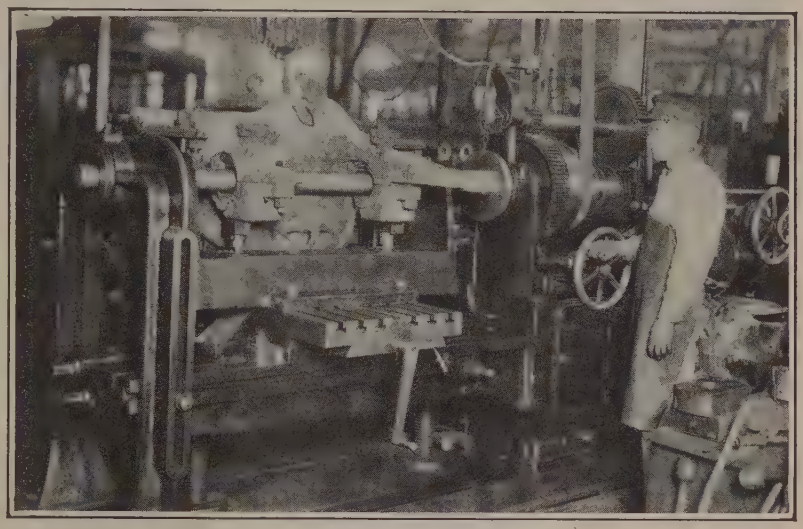


During the period before Christmas the *Elevated Express* has been displaying an unusual window poster in the elevated cars in New York City. This has been cleverly devised, as shown above, to encourage early shopping.

Improving Railway Motor Bearings

By Reboring Motor Frames to Make an Accurate Fit for New Simplified Housings and Improved Bearings the Public Service Railway of New Jersey Has Reduced Motor Troubles and Cut Bearing Maintenance Costs

AN ELABORATE program of rehabilitation of the older types of railway motors is being carried out by the Public Service Railway of New Jersey at its Newark shops. This consists of a complete change of the end housings and bearings, both armature and axle, on some motors, and on all others changes to provide for bronze bearings with thinner walls and the use of a new system of lubrication. Up to Nov. 1 of this year approximately 5,000 motors had been revamped, including Westinghouse types 68, 101-B, 101-C, 307 and 514 and General Electric type 80-C. Other types which will be remodeled in the near future include the Westinghouse 93, 310 and 508.

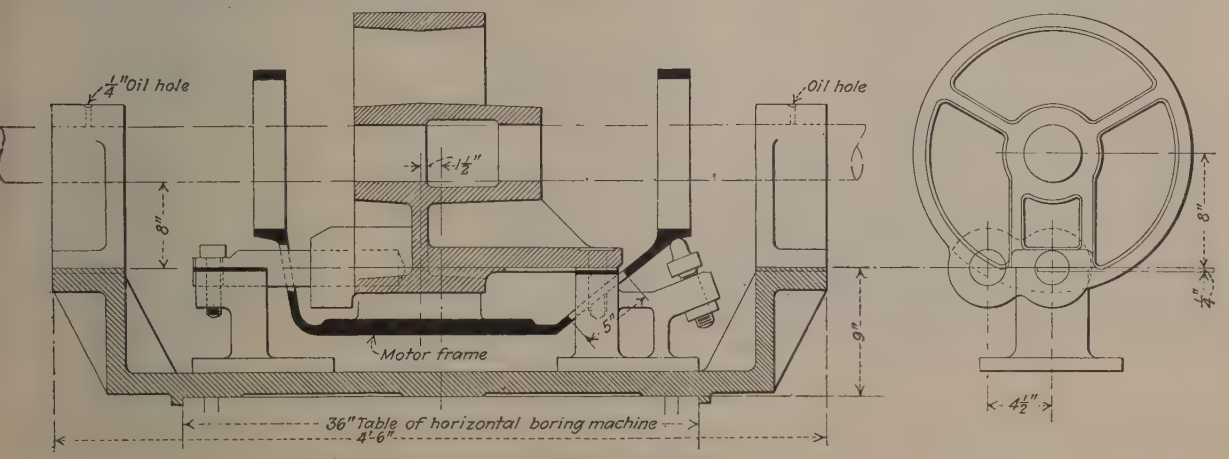


Reboring a Westinghouse Type 101-B-2 Motor Frame in the Newark Shops of the Public Service Railway

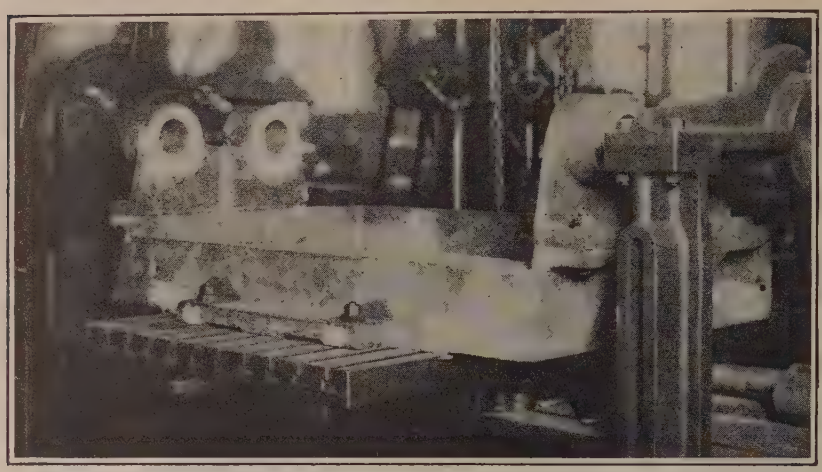
The tap bolts used to retain the armature housings on certain types of railway motors have always given much trouble due to their working loose in service. This looseness has caused wear on the outside of the housing, on the inside fits of the motor frame, and in wearing away of the threaded holes in the housings themselves. The result has been the loss of the clamping action of the two halves of the motor frame on the housing. Naturally the wear on other parts has been excessive, and the maintenance costs have been correspondingly high. The parts affected include armature windings, brush-holder parts and carbon brushes, as well as the bearings and housings.

For revamping the motors a through-bolt type of bearing housing has been designed. This is considered a great improvement over the old tap-bolt type, which had to be replaced on the average every 5 years. A new system of lubrication is being installed and other changes are being introduced. An entirely new type of housing is being used in the Westinghouse 101-B and 514 motors. All the other types used by the company are having the necessary changes made to install the new system of lubrication and to provide for bronze bearings with thinner walls than those previously used. The axle bearing caps and fits for the axle bearings in the frame also are being changed to make a more satisfactory design. The new design of housing used by the Public Service Railway is simplified and of lighter weight, requiring less care and expense in casting. Provision has been made for use of lighter weight bronze bearings and Rico vacuum oilers, giving a great reduction in the quantity of waste necessary for packing and maintaining the bearing lubrication.

Among the motors being revamped are both split and box-frame types. Some have armature bearing hous-



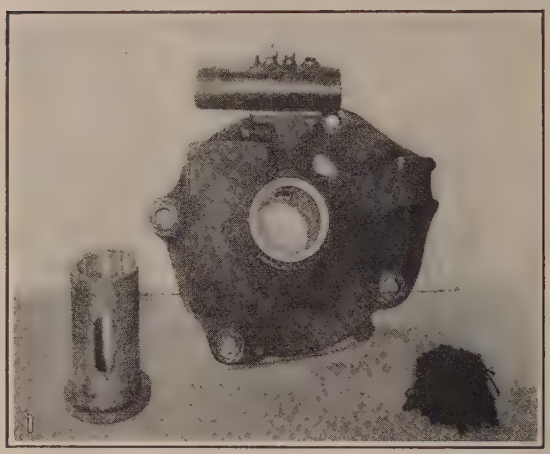
Set-Up and Jig Used for Reboring Westinghouse 101-B-2 Motors

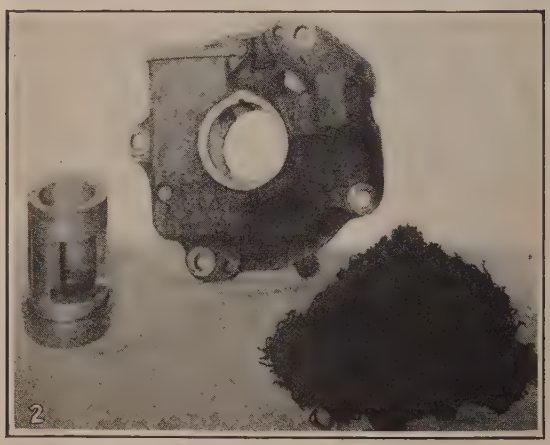


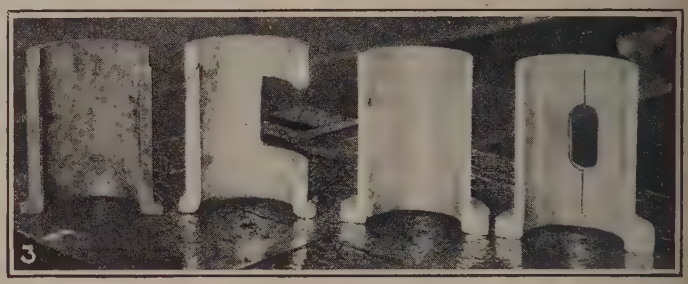
At Left, Frame of Jig Used for Holding Westinghouse Type 93 Motor During Reboring. At Right, Drum for Lining Up Bearing Fits from the Pole Face Seats of Motor Frame

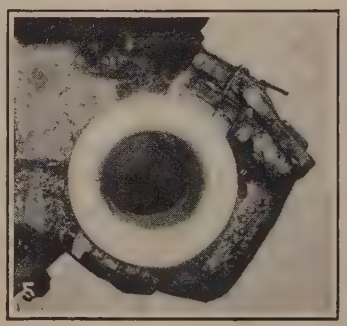
ings and others are without them. The work necessary with the different types varies, and the changes as made will be outlined for a representative motor of each class.

As an example of the work done on a split-frame motor with armature bearing housings, a housing of entirely new design has been provided for the Westinghouse type 101-B motor. In order to take up the wear in the housing fits of the motor frames, these are rebored to a diameter $\frac{1}{16}$ in. greater than standard, and the outside diameter of the fit on the housing is made larger than the original housing by $\frac{1}{16}$ in., plus from 0.002 to 0.006 in. The waste chamber and the oil pocket in the original design have been done away with. Instead provision has been made for a Rico vacuum









Changed Housings and Bearings Compared with Old Types

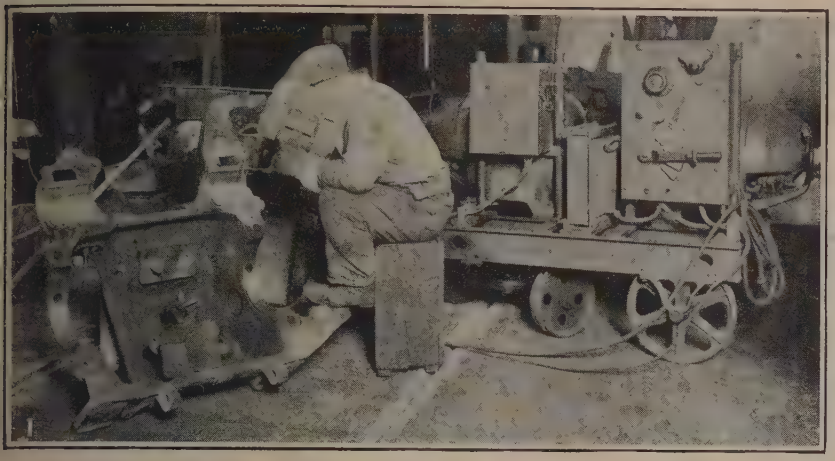
No. 1. New housing and bearing for Westinghouse type 307 motor with pile of waste used for packing.

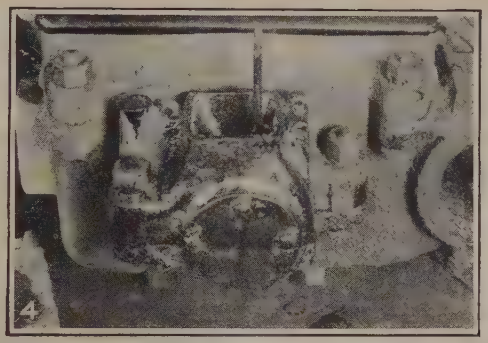
No. 2. Old housing and bearing for Westinghouse 307 motor with waste packing.

No. 3. Old and new axle bearings used with Westinghouse type 101-B motors.

No. 4. Old and new axle bearings used with Westinghouse type 68 motors.

Nos. 5 and 6. New and old arrangement of axle bearings for Westinghouse type 514 motor. In the new position shown in No. 5 the split for the bearing halves has been rotated from that used with the old construction to bring it horizontal.





Welding Operations Constitute an Important Part of the Rehabilitation Work

No. 1. Welding plates in the frame part of the axle bearing fit for a Westinghouse 101-B-2 motor.

No. 2. Plates are welded into the axle cap and frame of 101-B-2 motors to reduce the diameter of the bearing fit. At left, axle cap with plates welded in position. At right, finished axle cap. In front at bottom, plates used for welding in.

No. 3. Pile of Westinghouse 101-C axle caps with waste opening welded shut and adapter welded in place.

No. 4. Plates are welded into the waste opening of the General Electric type 80-C armature housing to form a V leading down to the window of the bearing.

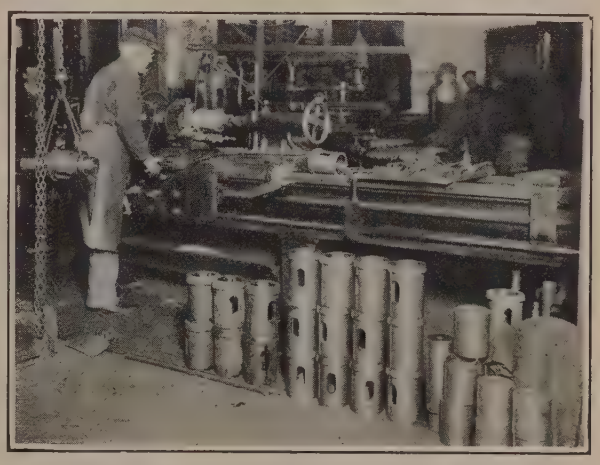
No. 5. New armature housing for Westinghouse 101-B motors.

oiler with a much smaller waste opening located directly on top of the shaft. The size of window in the housing itself has been decreased from $4\frac{11}{16}$ in. x $5\frac{3}{8}$ in. to $1\frac{1}{8}$ in. x $3\frac{1}{2}$ in., with a corresponding decrease in the bearing window. The bore of the housing into which the armature bearing is pressed has been decreased from $4\frac{7}{8}$ in. to $4\frac{1}{8}$ in., giving a corresponding decrease in the thickness of the bearing walls. Provision is made for the through-bolt type of fastening. Other simplifications in construction will be evident from the accompanying illustrations. The amount of waste required with the new housing is a handful as against 1 lb. with the old type.

Three Diameters of Shafts Provided For

For the 101-B motor, bearings are bored out to three standard sizes, which are the same for both pinion and commutator ends. These bores are $3\frac{1}{4}$ in., $3\frac{5}{16}$ in. and $3\frac{1}{8}$ in. inside the babbitt lining. As the outside diameter of the bearing is $4\frac{1}{8}$ in. plus the allowance for pressed fit, the thickness of wall for the $3\frac{1}{4}$-in. bore is but $\frac{3}{8}$ in. The bearings for the old-style housing with the $3\frac{1}{4}$-in. bore had a $\frac{3}{4}$-in. wall, so there is a reduction in thickness of the bronze of 50 per cent. The weight of an old 101-B pinion end bearing was 24 lb., while the new bearing weighs but $13\frac{1}{2}$ lb. The lubrication system now used has permitted a decreased size for the windows. For the commutator end, 101-B bearing, the window opening is 1 in. x $3\frac{1}{4}$ in., and for the pinion-end bearing 1 in. x $3\frac{1}{2}$ in. The window is beveled, so that the narrow dimension is $1\frac{1}{4}$ in. at the outside diameter. The old bearings have a window opening at the inside bore of the bearing of 4 in. x $2\frac{1}{4}$ in. for the commutator-end bearing and $4\frac{5}{8}$ in. x $2\frac{1}{4}$ in. for the pinion-end bearing. An increased bearing surface is thus provided in the new bearings which results in increased life.

The armature bearings used with the new housings are of bronze with $\frac{1}{16}$-in. babbitt lining. The com-



Turning Bushing for Westinghouse Type 307 Motors

A bushing on turning mandrel is shown in the sling attached to the crane ready for insertion in the lathe. In front at the left are six bushings ready for machining. In the center are bushings after being finished. At right, mandrel and other types of bushings used.

positions of the metals for the shells and linings are as follows:

COMPOSITION OF BEARING SHELLS AND LININGS, PER CENT

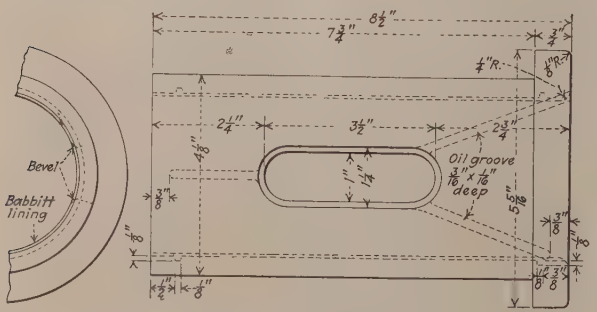
	Bronze Shells	Babbitt Linings
Copper	77	2 (Lake)
Tin	8	90 (Straits)
Lead	15	.....
Antimony	..	8

For the shells a variation of 10 per cent is allowable in the tin or lead, with a maximum impurity of 1 per cent. It is considered essential, to get good results, that only Straits tin and Lake copper be used in the babbitt lining.

An accompanying illustration shows the new design of armature bearings. Two oil grooves run from the window toward the flanged end of the bearing, one going entirely through, so as to lubricate the flange. One groove runs toward the outside end of the bearing. An accompanying illustration also gives the finished bearing tolerances allowed.

The pressure required for pressing bearings into housings runs between 4 and 5 tons. The reduced size for the waste-window opening has done away with buckling and distortion of the bearings while they are being pressed into the housing, giving a tighter and more even fit. No keys are used, but the bearings remain tight. Records show that after 100,000 miles of operation the pressure required to remove this new type of bearing from the head is far greater than with old-type bearings. There is better distribution of the oil with the waste window at the top of the bearing and the danger is eliminated of oil running between the bearing and the head, as in the older type. The waste is held in close contact and cannot fall away, and as it is continuously saturated with clean oil, glazing is eliminated. The necessity of inspecting the waste, teasing it, or repacking the bearing is thus done away with.

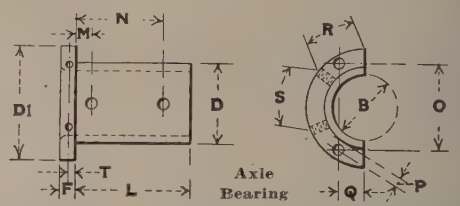
Another advantage found with the top feed bearing is the uniform use of oil. With side-feed bearings, the amount of oil delivered to the waste at the window depends upon the distance that the oil is lifted. In an article by C. Bethel in the ELECTRIC RAILWAY JOURNAL for April 19, 1924, the maximum lift for safe oil supply was given as about 3 in. and the minimum lift for reasonable economy as ¾ in. A variation from ¾ in. to



New Armature Bearing Construction Used for Westinghouse Type 101-B-2 Motors

3 in. in the lift of the oil was also shown to cause a variation of 8 to 1 in the oil feed. With waste-feed lubrication, oil is used again and again, sometimes after its lubricating value has been destroyed through accumulation of foreign material. With the top-feed bearing the oil passes through the bearing but once.

Axle bearings of railway motors are held tight by the clamping action between the axle caps and the frame. In addition, they are kept from turning by dowel pins or keys. The axle bearings for the 101-B motor used by the Public Service Railway were reduced in size from 6 in. outside diameter by 4½ in. bore to 5½ in. outside diameter by 4⅛ in. bore. The thickness of the wall was thus reduced from ¾ in. to ⅜ in. No lining is used in axle bearings and the composition is



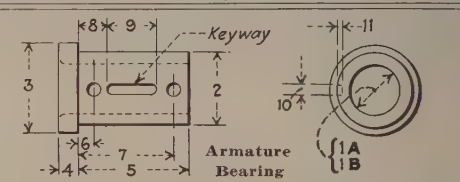
TOLERANCES FOR FINISHED AXLE BEARINGS, MINIMUM FOR WORK, MAXIMUM FOR INSPECTION

	Maximum, Inch	Minimum, Inch
B	+0.016	+0.012
D	+0.016	+0.003
D1	+0.031	—0.031
F	+0.016	—0.016
L	+0.000	—0.062
M	+0.016	—0.016
N	+0.016	—0.016
O	+0.031	—0.031
P	+0.016	—0.016
Q	+0.016	—0.016
R	+0.031	—0.031
S	+0.031	—0.031
T	+0.047	—0.000

TOLERANCES FOR FINISHED ARMATURE BEARINGS, MINIMUM FOR WORK, MAXIMUM FOR INSPECTION

	Maximum, Inch	Minimum, Inch
1A*	+0.013	+0.009
1B†	+0.031	—0.000
2	+0.004	+0.003
3	+0.031	—0.031
4	+0.016	—0.016
5	+0.031	—0.031
6	+0.016	—0.016
7	+0.016	—0.016
8	+0.031	—0.031
9	+0.031	—0.000
10	+0.000	—0.002
11	+0.031	—0.000

*Bore in babbitt. † Bore in shell.



Tolerances for Finished Axle and Armature Bearings

the same as for armature bearings. The improved lubricating system permitted the axle bearings to be split in a horizontal line. The window is in the center of the upper half, while the lower half is solid.

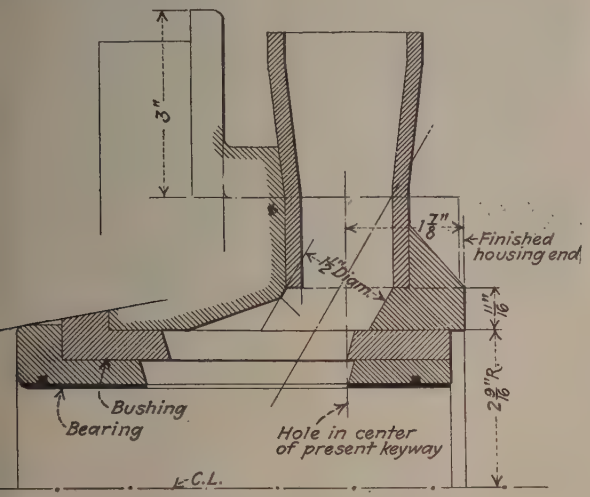
The window opening in the old bearing was 3⅞ in. long and occupied an angle of 90 deg. in the half bearing. The new bearings have windows 2⅝ in. long by 1¼ in. wide. The original bearings had a ⅛-in. dowel hole in the half containing the window. The new design provides two ⅜-in. dowels in the solid bottom half of the axle bearing. Two oil grooves are used in the upper half of new bearings. Many of the advantages of the new design of armature bearing also apply to the new axle-bearing construction. Placing the split in such a position that the wear will not come at that point is an advantage. The relocating of the bearing also gives more metal around the dowel holes.

To reduce the size of the opening in the motor frame and axle cap four steel plates are welded in for each bearing opening. Two are in the motor frame and two are in the lower half or axle cap. The space at the edges of the plates and between them is then filled in with the electric arc, after which the opening is ready to be bored out to size. On 101-B motors, the adapter for the new oilers is welded to the motor frame, so as to come on top of the axle bearing. This adapter also provides the opening for the waste and for lubrication to the bearing. The original opening through which the waste was inserted for packing is welded shut, eliminating the covers and any danger of water entering, due to loose or chattering covers.

In addition to the 101-B motors, the Public Service

Railway also has a number of 101-C motors. These have a somewhat different axle-bearing arrangement. In the latter type the adapter is welded into the axle cap and a sheet-iron cover is welded on to close the original waste opening. Accompanying illustrations show the two types and the various methods of welding required.

The work of reboring motor frames, which follows



Method of Applying Bushings to the Housings of Westinghouse Type 307 Motors

the welding, is carried out on a single-spindle horizontal boring mill. The Newark shops of the company have two of these machines, one being a Niles mill and the other made by the Betts Machine Company. The jig used in connection with this reboring is an important part for securing accuracy of the work as well as speed. Two men with one of these machines will rebore eight motor frames in 24 hours.

The jig, which is shown in an accompanying illustration, consists of a heavy iron casting with lugs on the base for supporting the motor frame and uprights at each end, with holes through which the boring bar rotates. The centers for reboring the armature and axle fits are obtained from the pole face seats. The lining up from the pole seats is obtained by means of a large drum mandrel which fits inside the motor and has plates on the outside to fit against the pole faces. It is shown in an accompanying illustration. By varying the thickness of these plates, the same drum may be used for different types of motors.

One of the supporting brackets for the motor frames has an extension which passes up through the bottom hand hole of the motor frame. The top of this extension is used for bolting the central drum in position. Various screw adjustments on the jig provide for rapid adjustment of the motor frame when it is once set. The central drum, together with the end support for the boring bar used to bore out the armature housing fits, provides for accurate location of this from the pole face seats of the motor, and the bearings for the boring bar which bores out the axle bearing fit are accurately located from these. The boring bar has two cutting tools, so that two armature housing fits or two axle bearing fits are machined at the same time. In reboring, a rough cut and a finishing cut are taken. Setting up a motor for reboring takes about one-tenth of the total time required for the entire finishing operation. Both boring mills are served by jib cranes, which are of material assistance in handling the work and heavy parts of the jigs and in adjusting the motor shells for reboring.

Procedure on Box Frame Motors

The work done on box frame motors is essentially the same as for the split-frame Westinghouse 101-B motor. Several of the illustrations show various details used with the Westinghouse 307 and 514 types, which are both box frame motors. In some cases variations in design make necessary some different methods. The General Electric type 80-C motor has the waste opening for the armature bearing on top. In this case two plates are welded into the opening so as to form an open-ended V with the narrow opening at the window of the bearing. The oiler is bolted directly to the top of the housing without an adapter, and the modified waste opening is used as a receptacle for the waste.

The original armature-bearing housings of the Westinghouse 307-CD-3 and CD-4 motors, which are of box-frame type, are used by pressing in steel bushings to reduce the size of the armature-bearing fits. An accompanying illustration shows the construction used. These steel bushings have a ½-in. wall so that the walls of the armature bearings are reduced by this amount. The old armature bearings were 5⅛ in. outside diameter. The new bearings are 4⅞ in. diameter, with an inside bore of 4⅛ in. The adapters for mounting the oilers are welded into the tops of the housings, and an opening is made in the steel bushing in line with the bearing window. In this case the work consists of boring out the housing and cutting a recess for the opening at the top, after which the adapter is welded in place and the steel bushing is pressed in. The work of machining the steel bushing is done on a small lathe, and the bushings are held by a special mandrel for turning.

Cars Operated Over New Concrete Roadbed in 26 Hours

THE use of Lumnite quick-hardening cement allowed the Albany Southern Railroad to operate heavy interurban cars over a new concrete roadbed in Hudson, N. Y., in a remarkably short time after its construction. The concrete was poured during the morning of Oct. 26,

This 32-Ton Interurban Car Was Operated Over a New Concrete Roadbed 26 Hours After Its Construction

1924. On the following morning, only 26 hours after pouring, a 32-ton interurban car was operated over this track. No damage whatsoever resulted to the pavement. Lumnite cement was used in this case because the route is one over which the interurban cars are scheduled on a comparatively short headway and it was desired to

reduce to a minimum the time the track was out of service.

Lumnite cement is made by the Atlas Lumnite Cement Company and is essentially aluminous. Its chemical composition is approximately silica, magnesia, etc., 5 per cent; alumina, 40 per cent; lime, 40 per cent, and iron oxides, 15 per cent. It is used in the same general way as portland cement, except that on account of its more rapid hydration slightly wetter mixtures are used. For several hours after setting the surface must be kept damp to prevent incomplete hydration.

While this cement develops at 24 hours a greater strength than ordinary cement develops in 28 days, it is not quick setting. It allows the usual time for mixing, transporting and pouring into forms, but after setting its early strength develops with great rapidity. These qualities are of special advantage in such cases as that occurring at Hudson, and a number of street railway companies are experimenting with this cement.

Steel Reinforcing Bar Sizes Simplified

THE Division of Simplified Practice of the Department of Commerce, through the unanimous action of a joint conference of representatives of manufacturers, distributors and users of square and round steel reinforcing bars, has promulgated a simplified list of recognized sizes for the purpose of eliminating a large number not in common use, as follows:

Area in Square Inches	Size in Inches	Style
0.049	¼	Round
0.110	⅜	Round
0.196	½	Round
0.250	½	Square
0.307	⅝	Round
0.442	¾	Round
0.601	⅞	Round
0.785	1	Round
1.000	1	Square
1.266	1⅛	Square
1.563	1¼	Square

This reduced list of sizes becomes effective as applying to new production Jan. 1, 1925, and will remain in effect for a trial period of one year, at the end of which time all interested organizations will be given an opportunity to suggest modifications or additions.

How Treadle Works on Toronto One-Man Cars

SINCE the publication in ELECTRIC RAILWAY JOURNAL for Nov. 8, 1924, page 799, of an article describing the automatic rear exit doors on Toronto rebuilt cars,

The Treadle Which Operates the Rear Exit Door Is 9½ In. Below the Level of the Rear Platform

At Left, Rear End of Rebuilt Toronto Car Equipped with Automatic Exit. At Right, by Means of This Mirror the Motorman Can See the Condition of the Rear Exit

additional information and photographs have come to hand. In the accompanying illustrations are shown the step from the rear platform down to the treadle, and the sign directing passengers who wish to get off the car.

Another picture shows a passenger standing on the treadle with the door in the open position, and the lower step down. A third picture shows the mirror fastened to the front door of the car in such a way that the motorman can see clearly the condition at the rear end of the car.

The Readers' Forum

Both Babbitt and Tin Used for Thin Lining of Bearings

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

EAST PITTSBURGH, PA., Nov. 20, 1924.

To the Editors:

In the Oct. 25, 1924, issue of ELECTRIC RAILWAY JOURNAL, page 725, under the title of "Armature Bearing Practice for Railway Motors," there is a statement to which I wish to call attention. Quoting from the JOURNAL:

"There is, however, a decided tendency away from the babbitt lining for armature bearings. Motor manufacturers are now furnishing a bronze type of bearing with thin tin linings almost entirely with their new motors."

Regarding the above, it appears that this refers to axle bearings instead of armature bearings, as it is the practice of the Westinghouse Electric & Manufacturing Company, and I believe also of the General Electric Company, to use solid bronze axle bearings tinned. However, for armature bearings, bronze bearing shells with from a $\frac{1}{16}$ in. to $\frac{1}{8}$ in. lining of babbit metal is considered good practice. JOHN S. DEAN,

Renewal Parts Engineer.

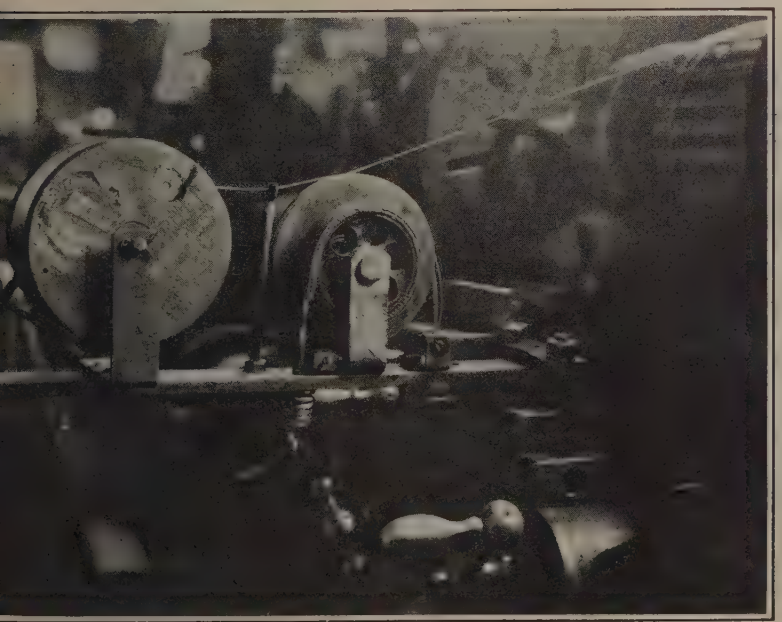
Equipment Maintenance Notes

riction Brake Puts Tension on Banding Wire

A WINDING brake consisting of a grooved steel friction drum and brake drum mounted on one shaft used by the Gary Street Railway, ary, Ind., to maintain a uniform nsion on banding wire being wound n an armature. The banding wire asses around the grooved drum be- re it is fed to the revolving arma- re, while a lined metal band rapped around the brake drums re- rds the rotation and applies tension the wire.

The shaft is mounted on a -shaped support, fastened to a steel ar, one end of which is bolted to the rriage of the lathe. Near the other d of the bar is a second support lding the wire reel. A light brak- g effect is used to keep the reel om spinning. Between the reel d the drums is a guide. This ar- ngement is shown below.

The friction drum has a diameter 9 in. and is 1 in. wide, with five mi-circular grooves, of the same ze as the banding wire, cut in the ce. From the reel the wire passes rough the guide and thence to the tside groove of the friction drum. is carried around the drum four times, a small pulley being used to change the wire from one groove to the next. The brake drum is 1 in. wide but has a diameter of only 6 in. A brake band around this drum is fitted with ordinary automobile brake-lining material. One end of the band is attached to the supporting frame while the other is fastened to a threaded rod which passes through the horizontal supporting bar. The brake pressure is adjusted by means of a winged nut which rests against a compression spring at the threaded end of the brake band below the horizontal bar. This apparatus has been found very satisfactory to maintain a uniform tension in the banding wire.



Friction Drum Apparatus Used to Keep an Even Tension on Banding Wire

Bearings Rebored to Fit New Style Motors

AT THE time when the Eastern Massachusetts Street Railway decided to replace all of its type 67 motors by those of a newer model it had on hand a large number of armature bearings of the old design. In order to adapt these for use in modern motors it was decided to rebore them. The bearings originally designed for use on the commutator end of the No. 67 motor was rebored for use on the pinion end of No. 247 motors. The pinion end bearing of the old No. 67 motor was rebored for use on the pinion end of type 200-E motors. By this process the railway was able to obtain a year's supply of new bearings of types now needed.

Pipe Bending Machine Built in Kansas City Shop

By JOHN W. HOGAN
Foreman Kansas City Railways

THE machine shown in the accompanying illustration was built in the shop of the Kansas City Railways for bending the larger sizes of pipe and conduit.

As shown in the illustration, the forming die is mounted on a face plate, hand driven through reducing gears by four long levers. The end of the pipe is slipped into a U clamp mounted at one end of the die. A small roller fastened to the frame of the machine holds the pipe in position as the face plate is rotated.

This Hand-Driven Pipe Bending Machine Built in the Shops of the Kansas City Railways Has Proved to Be a Valuable Time Saver on Large Reconstruction Jobs

Forms of various sizes can be used in connection with the machine, and they are inexpensive to make up. For conduit work it is, of course, undesirable to make bends of very short radius, due to the difficulty of pulling the cables into place. As used in the Kansas City shop, several different forms for the various sizes of conduits have been found particularly useful. This includes forms for mak-

ing bends of 7-in. and 10-in. radius in 1-in. and 1¼-in. pipe, 7-in. and 14-in. bends in 1½-in. pipe, and 16-in. bends in 2-in. pipe.

On the larger overhaul and rebuilding jobs such as are undertaken in most electric railway shops this machine has proved to be a particularly valuable time saver.

Steel Roller Chains for Snow Sweepers

WHEN the snow sweepers of the Altoona & Logan Valley Electric Railway were overhauled last summer in preparation for the coming winter, steel roller chains to drive the brooms were installed in place of the old malleable-iron link chains. This was accomplished at small cost under the direction of C. E. Keefer, master mechanic. In the past, some trouble was experienced on account of breakage of the malleable-iron

More Reliable Sweeper Operation Is Secured by Using Steel Roller Chains

chains while the sweepers were at work. It is expected that the new chain will eliminate this trouble, and will last as long as the sweepers themselves. Another interesting point in connection with the overhauling of the sweepers is the fact that they were painted a bright red to increase the visibility.

Convenient Mounting for Pinion Puller

AN ARMATURE mounting used in connection with a pinion puller in the 39th Street shops of the New York Rapid Transit Corporation, Broklyn, N. Y., is shown in the accompanying illustration. The ar-

Dick Prescott Starts His Journey

And Rehearses Some Questions

AT LAST Dick Prescott, the newly appointed engineer of equipment of the Consolidated Railway & Light Company, and Steve White, the carpenter shop foreman, found themselves in the club car of the Limited bound for Centerville, the first stop on their trip of inspection. They had made out an itinerary and also had made up a list of things to go over on each property visited. Both Dick and Steve had carefully reviewed the files of ELECTRIC RAILWAY JOURNAL before starting. In that way they were able not only to select properties showing the most evidence of progressiveness, but also had found that the complete information available made it possible for them to concentrate on getting a first-class impression of how the new methods work out in practice.

"Well, Steve," said Dick, as they settled back on the cushions, "tomorrow we ought to have an interesting time out at the Centerville Railway shop." Taking a memorandum book from his pocket, he continued:

"I've made up a list here to use as a guide in asking questions about the work of the engineering departments. Here's some of them.

"How many men in engineering department?

"Is the policy to standardize parts and fittings used on cars?

"Do they have a drafting room?

"Are drawings made of standard patterns—and are they kept up to date?

"Do they make sketches for special jobs?

"Are limits of wear established for parts frequently renewed?

"Does the engineering department follow up the performance of parts put on cars for test?

"Are wiring diagrams and data put in convenient form for shop and carhouse foremen?

"Does the engineering department prepare specifications for new material?

"Does it co-operate with the storeroom and make drawings for ordering special parts?

"Does an inspector reporting to engineer of equipment determine if drawings are followed and if maintenance methods are up to the standard?

"Does it prepare estimate on cost of new work and issue storeroom requisition for materials on special jobs so that they can be ordered early enough to be on hand when wanted?

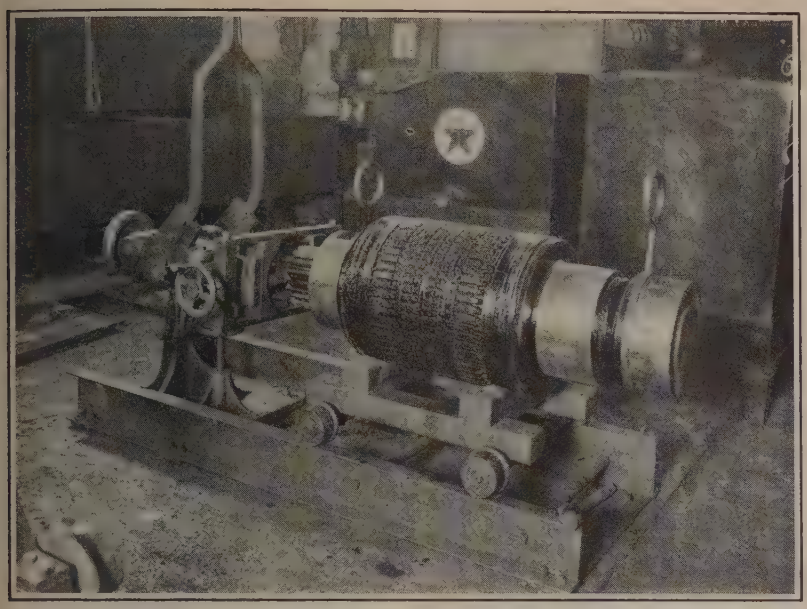
"Does it ....."

Then Steve interrupted. "Gosh, Dick, that list must be a mile long. You're way ahead of me. I can see you've put lots of thought in there and I want to go over your questions when we can discuss them more fully. You've got work enough laid out there to keep an engineering department busy for a long time."

"Of course I have, but I haven't even scratched the surface. Remember this, Steve. So far as I can see every one of those functions is being performed by somebody in every railway shop. If an engineering department doesn't do them, then somebody else who ought to be putting all his time on productive work is doing them. If they are not being done right, the whole shop is working at reduced efficiency, work is spoiled, and maintenance costs are higher than they should be and pull-ins are too numerous."

"That's the spirit, Dick. You're going at it the right way. But I think you're working on something almost entirely new in this old electric railway game and it'll be a hard grind to make our shop really understand what you're driving at. We can't settle it tonight, anyway, so let's turn in so as to be all fresh in the morning when we visit the Centerville people."

"I guess that's a good idea," said Dick as they moved out the door. "I'll shoot these questions at them tomorrow and find out what they've got to say."



A Carriage with Adjustable Wedges that Centers the Armature with the Pinion Puller

mature is placed on a carriage, so that it can be pushed into position readily and is always centered with the pulling apparatus. The carriage, which consists of a wooden framework with four small cast-iron wheels, moves back and forth on a short track made of two pieces of 6-in. channel. The armature support on the carriage has wedges with four different bevels, adjusting the height to support four different armature diameters. The faces of the wedges are marked so that they can be readily placed in position for the particular type of armature from which the pinion is to be removed, so that it will come central with the shaft of the pinion puller when shoved into position.

To remove a pinion the carriage is pushed forward so as to come in contact with the central shaft of the pinion puller which rests against the end of the armature shaft. Two jaws which go in between the end of the pinion and the head of the armature slide in guides and are moved by a screw with a handwheel on the side of the guide. Another screw on the end of the pinion puller forces the central shaft firmly against the armature shaft. The pinion then can be removed by pulling the vertical handle which actuates an eccentric cam to give the necessary force for removing it. The pinion puller was made by the Metropolitan Engineering Company, Brooklyn, N. Y., but the mounting and adjustable features were made in the shops of the railway.

Old Car Made Into Traveling Paint Shop

SINCE the building of the new Everett shops of the Boston Elevated Railway, car painting has been done there whenever possible. The cars operated in the Cambridge subway, however, are too wide to be operated over the tracks reaching the new shops. For that reason a traveling paint shop has been arranged by building a new body on the frame of an old single-truck car. This vehicle carries a complete outfit of painters' supplies and also provides a place where the men can change their clothes. The car is not motorized, but is pulled from place to place by a service car. Since its completion the traveling paint shop has proved to be a convenience for the purpose intended, as well as for other odd painting jobs.

This Car Carries a Complete Outfit of Painters' Supplies and Provides a Place Where the Men Can Change Their Clothes

Reclaiming Worn Compressor Cylinders

WHEN air compressor cylinders become badly worn or scored the efficiency falls off very rapidly. Several different methods are used for reclaiming the cylinders, the most common being to follow the automotive practice of grinding the cylinder to an oversized dimension and using oversized pistons.

The Twin City Rapid Transit Company's mechanical department does not use this method because of the necessity of carrying special pistons in stock, and also because the capacity of the compressor is changed by the oversized bore. Instead, the practice on this property is to bore out the worn cylinder to a predetermined dimension and then to insert cast-iron sleeves which are pressed into the cylinder. These sleeves are then bored and ground to a final finish which retains the original standard size for the bore.

When the cylinders are bored out, they are made large enough to leave the finished sleeve with approximately a $\frac{1}{8}$-in. wall. Before they are pressed in and rebored, these sleeves have an interior bore small enough to give a wall thickness of sufficient strength to withstand the strain of pressing into place in the cylinder. This thickness is approximately $\frac{1}{2}$ in.

The cylinders themselves are bored 0.002 to 0.003 in. under the outside diameter of the sleeves, to allow for a press fit.

When the cylinder is bored out, a shoulder is left near the bottom of the cylinder wall, and this forms a stop for the sleeve when the latter is being pressed in. If the cylinders become worn or scored a second time, it is a simple operation to bore out again and install new sleeves.

New Equipment Available

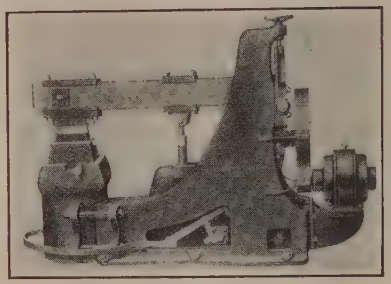
Air-Cushioned Helve Hammer

AN air-cushioned helve hammer with many new features in design is being introduced to the market by Baudry Company, Inc., Everett, Mass. The hammer has a semi-inclosed frame, upon the rear of which is an adjustable yoke supporting the helve at its pivoted end. The air compressor within the frame is cast in one piece with a cylinder actuating the helve, the piston of which connects with the helve. A rotary valve operated by the treadle is located between the two cylinders for controlling the blow.

The machine is designed for either belt or motor drive. When belt driven, tight and loose pulleys and belt shifters are included as a part of the unit. For motor drive, the tight pulley is replaced by a gear engaging the pinion of the motor, making the machine entirely self-contained.

The hammer has no rubber bumpers, being cushioned entirely by air. The machine will also deliver its lightest tap or its heaviest blow at full speed. This results in increased production. Regulation by the pedal does not change the speed of the hammer but only the strength of the blow. When at rest the hammer is at the top of its stroke with the helve elevated and dies apart ready to receive the work. The hammer compresses its own air so that no outside supply is necessary. The two cylinders are cast integral with the semi-inclosed frame. One compresses air and the other distributes it for the use of actuating the hammer helve. The air supply to the cylinder is regulated by a rotary valve operated by a treadle. The hammer helve is adjustable for varying thicknesses of stock. The anvil is entirely separate from the main frame casting.

The pivot of the helve has hardened steel centers easily adjustable and affording a means for entirely eliminating side play of the dies so that they will always register with each other. When adjusting the dies for different thicknesses of work, four nuts are loosened on the pivot yoke and the hand wheel on top of the machine is turned the proper amount to raise or lower the yoke, after which the four nuts are tightened. The connecting rod of the helve is adjusted by a turnbuckle. This makes the adjusting a one-man job. The machines are built in four sizes with from 40 to 200 lb. rams. The floor space occupied is small, being 26 in. x 60 in. for the 40-lb. size and 36 in. x 75 in. for the 200-lb. size.



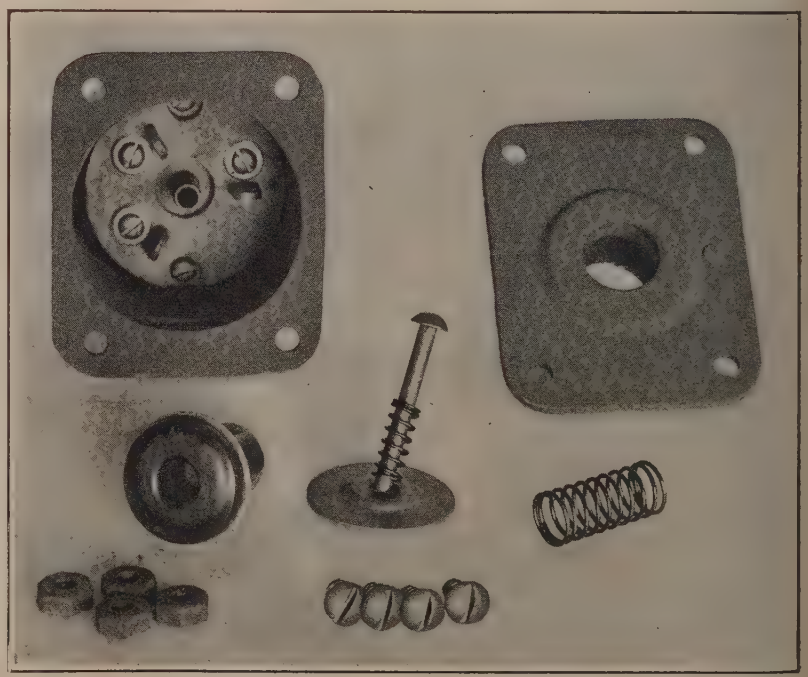
Helve Hammer with Air Cushioning

Push-Button Switches for Door Control

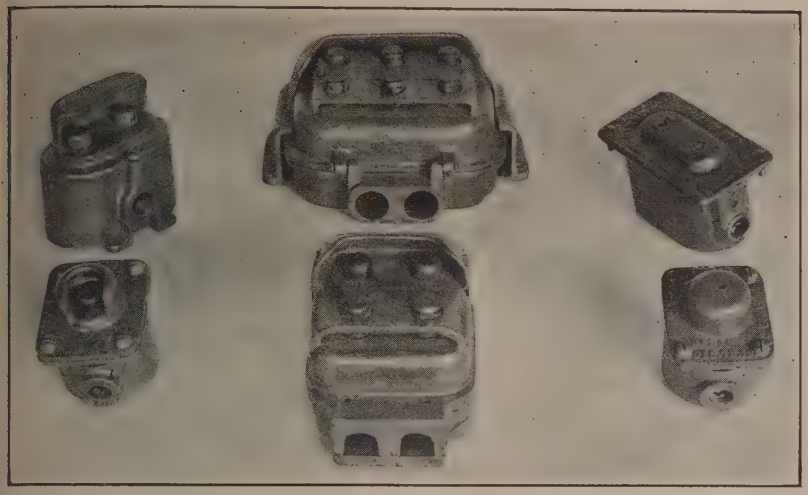
SEVERAL improvements have been made in the construction of the 307-type of push-button switches furnished by the Consolidated Car Heating Company, Albany, N. Y., for electric control of door engines. An accompanying illustration shows some of these switches, which are made in single, double, four or six-button units. All have cast-iron cases.

The contact disk is made in two types. For low-voltage use (battery circuits) a metallized carbon disk is employed, and a monel metal disk is used for 600-volt circuits. When the metallized carbon disk is used, a reinforcing plate is added to prevent breaking.

In the illustration which shows the details of a single-unit 600-volt switch, it will be noticed that the monel metal disk has a boss at the center. This provides for a rocking action of the disk, so that it will make firm contact without being influenced by the pressure of the push button or stem. Two helical springs are used with this construction, one between the insulated base and the disk to open contact as soon as pressure is released, the other between the push button and the disk to permit a further movement of the push button after the disk is firmly in contact. The springs are of phosphor bronze to eliminate corrosion.



Details of Single Unit Push-Button Switch for Door Control

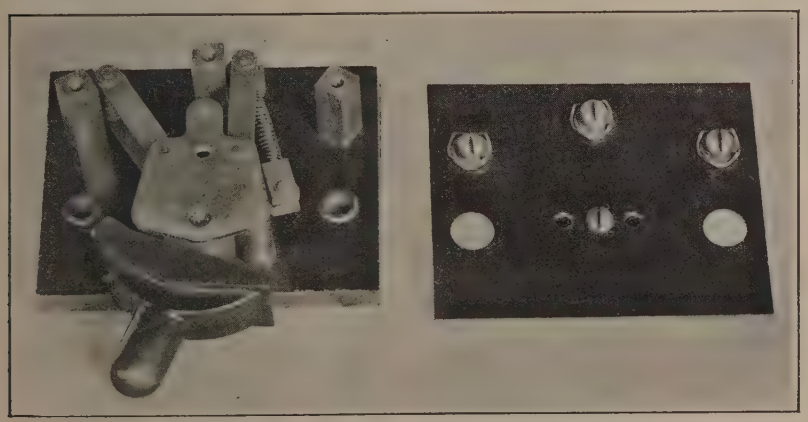


Six Types of Push-Button Switches Used for Electric Control of Car Doors

The cases are arranged for conduit connection and are ventilated to prevent an accumulation of moisture. The stationary contacts are mounted on a molded base. The plunger has a long guide to eliminate binding and is provided with a button head to fit into a recess in the push button. This button head allows the button to rock, so that a side thrust will not interfere with the working of the plunger. A rawhide washer between the back flange of the button and the case takes up any shock in case the button is released suddenly, and eliminates breakage. The standard construction for the stationary contacts is with three posts. This insures better contact. The cases are provided with shields to protect the buttons where there is likelihood of passengers leaning against them. In the illustration showing six types of switches, the two at the right without push buttons are arranged for outside operation of doors. A small opening in the cover provides for the insertion of a nail or small wire to operate the button. Improvements have also been made in the electric switch which is furnished for door control, where push buttons are not desired. The operating mechanism of this switch is of toggle form so that the switch is thrown with a snap as soon as the operating handle passes the center. The switch has a bakelite handle and the bearings of the toggle mechanism are of hardened steel. An accompanying illustration shows the construction.

Twist Drill Grinder

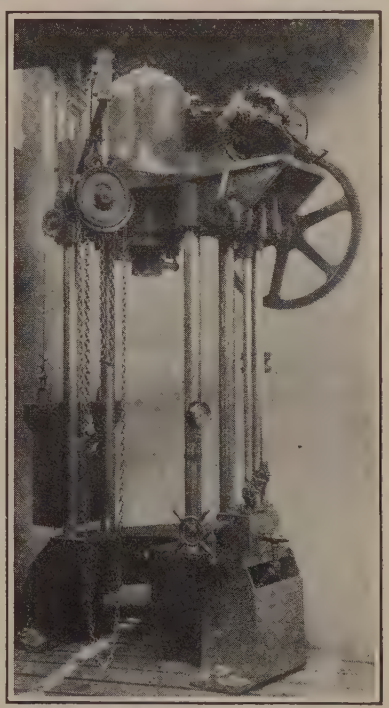
AN ELECTRICALLY driven 6-in. bench or pedestal grinder which will quickly and accurately grind straight or taper-shank twist drills up to $\frac{5}{8}$ in. in diameter has been placed on the market by the Black & Decker Manufacturing Company, Towson, Md. The twist drill is fed to the cup-grinding wheel by means of a micrometer screw feed. No adjustments are necessary for grinding different sizes of twist drills, this being compensated for in the new design.



Toggle Switch Used for Electric Control of Door Engines

Rapid Action Hydraulic Press

A SELF-CONTAINED rapid action hydraulic bushing press has recently been placed on the market by the Southwark Foundry & Machine Company, Philadelphia, Pa. The press is entirely self-contained and is complete with a hydraulic pump and electric motor so that no auxiliary water or air connections are necessary. The rapid movement of the ram is obtained by a triplex pump with one low and two high pressure plungers. The high-pressure plungers are of small diameter. The third plunger is of larger diameter and pumps a large volume of water, bringing the ram rapidly down to the work. As soon as contact is made



This Hydraulic Press Has a High and Low-Pressure Triplex Pump to Do Fast Work

the pressure builds up in the cylinder and the low pressure plunger then automatically cuts out and the working pressure is supplied by the high-pressure plungers. A counterbalance returns the ram to the starting position.

The bottom platen or work table has the slack water tank as an integral part of it. This platen can be furnished in several designs to suit work. The press can be furnished in capacities of from 30 to 200 tons. An overhead jib crane is supplied to take a chain block hoist so as to handle work on both sides of the press.

Association News & Discussions

Hoover Conference on Road Safety

Representatives of All Concerned in Street Traffic Safety Gather and Give Solution of the Accident Problem a Big Impetus by Drawing Set of Principles for Guidance of All in Developing Proper, Adequate and Uniform Laws and Regulations

UNDER the auspices of the federal government, a most remarkable nationwide conference directed toward reduction of the serious number of accidents on our streets and highways was held in Washington, Dec. 15 and 16. The National Conference on Street and Highway Safety was called by Herbert Hoover, Secretary of Commerce, who personally acted as chairman during a large part of the deliberations. The attendance of some 500 came from practically every state in the Union and included representatives of every industry and activity having any concern with the use of the streets and highways. There were police officials, public service commissioners, highway and motor vehicle commissioners and representatives of insurance companies, railroad and street railway companies, safety councils, chambers of commerce, labor unions, women's clubs, automobile associations, automobile manufacturers, and various other national groups. National associations which co-operated with the Department of Commerce in organizing and financing the conference were the American Electric Railway Association, American Railway Association, American Automobile Association, American Mutual Alliance, National Automobile Chamber of Commerce, National Safety Council, National Bureau of Casualty and Surety Underwriters, the National Taxicab Association and the Chamber of Commerce of the United States.

The morning session on Monday was given over to a presentation by summary of the eight committee reports which had been prepared at the direction of Secretary Hoover during the past six months. These covered statistics, traffic control, construction and engineering, city planning and zoning, insurance, education, the motor vehicle and public relations. The personnel of each of these committees was made up of men selected by the secretary in co-operation with the various associations and organizations in order to get the most competent as well as most representative groups together on each committee. E. J. Murphy, chief statistician American Electric Railway Association, was a member of the committee on statistics. J. P. Barnes, president Louisville Railway, was a member of the committee on traffic control and the committee on public relations. C. E. Morgan, vice-president Brooklyn City Railroad, was a member of the committee on construction and engineering. L. S. Storrs, president the Connecticut Company; Daniel L. Turner, consulting engineer New York State Transit Commission, and Charles B. Scott, Bureau of Safety, Chicago, were among the members of the committee on city planning and zoning. Mr. Scott was also a member of the committee on insurance. Edward Dana, general manager Boston Elevated Railway, and W. D. B. Ainey, chairman Public Service Commission of Pennsylvania, were members of the committee on education. L. H. Palmer, vice-president and general manager United Railways & Electric Company of Baltimore, was a member of the committee on the motor vehicle. Thus the electric railway industry was represented on each of the committees.

At the afternoon session on the first day the eight committee reports were opened to discussion. At five o'clock Chairman Hoover announced that the time had come for the various groups to assemble, according to an announced plan, and each to select a delegate to represent it on the "steering committee" which would meet that evening to draw up a report that would form a consolidation of the eight individual committee reports and place a definite program of recommendation before the conference on the following morning for its action. The electric railway group selected L. H. Palmer as its representative and Mr. Barnes also served on the steering committee by virtue of being official delegate of the American Electric Railway Association.

On Tuesday the conference went over the consolidated report, point by point, and passed upon it. The debate on many points was lively and earnest. Each point in the final report represents the harmonizing of views, first in the committees, then in the steering committee, and finally by the conference as a whole, so that it is an expression which probably comes as nearly as can be obtained to meeting the approval of all interests. A review of the final report as adopted by the conference follows:

Recommendations Requiring Legislation

Under the general heading of Legislative Principles, the report indicates the desirability of avoiding too much detail in legislation, and also advises a minimum of restrictive laws and regulations. As to the part of the federal government in this program, the report states that it is one of encouragement, of assembly and distribution of information, and the development and use of best practices, but expresses the belief that uniformity of traffic laws will be secured by voluntary action of the various states.

Each state should enact constructive legislation, including enabling acts, which will empower cities and other local units to provide for a proper development of the traffic situation in their territories. A state department or bureau should be created to administer the laws applying to motor vehicles, including the issue and revocation of licenses for both cars and drivers and the enforcement of regulation on the highway. The motor vehicle department should have a staff adequate and qualified not only to handle licenses but to examine drivers, regulate traffic on the highways, investigate accidents and enforce regulations regarding design, construction, inspection and maintenance of motor vehicles. Regulatory legislation should be for adoption by states and not by cities.

Under municipal government there should be an adequately manned traffic division in the police department, with traffic safety a major function. In all states and municipalities there should be specific provision for adequate and timely planning of traffic facilities and traffic control measures. These should be closely co-ordinated nationally, between adjoining states, and between states and their political subdivisions. Large metropolitan areas should establish special traffic planning commissions to study the flow of traffic and to eliminate hindrances to this flow and correct unsafe traffic conditions.

Full Stop Urged at Dangerous Railroad Crossings

To eliminate grade crossing accidents, the conference recommended that legislation be passed requiring all motor vehicles to come to a full stop before crossing such railroads as are designed and marked accordingly by the state railroad or public utility commission. In other words, the stop law as a principle is indorsed, but its application in each case is left to the judgment of the state commission, rather than to suggest a blanket law applying to all grade crossings. Elimination of grade crossings, either by relocation of highways or rail lines or by grade separation, the report states, constitutes the only perfect solution of the grade crossing problem. But this should be carried on under proper programs, so as not to impose an excessive financial burden, resting in the last analysis upon the public. Relocation of highways offers many possibilities not yet fully developed, which should be worked out by the state authorities in co-operation with the railways. Authority to order grade separation or proper protection at grade crossings should be vested in the state commis-

Coolidge Stresses Urgency of Conference Task

PRESIDENT COOLIDGE asked the privilege of addressing the Hoover Conference and at 2 p.m. on Tuesday made the following statement to some 500 delegates assembled before the South Portico of the White House:

The national conference on street and highway safety has been called by the Secretary of Commerce for the devising of means and the making of recommendations toward the lessening of the numberless accidents which now kill and maim so many of our citizens. Few conferences are more opportune or deal with graver affairs. With the deplorable and continuing increase in highway mortality and injury the time is highly appropriate for a comprehensive study of the causes, that we may have proper understanding of conditions and so may intelligently provide remedies.

The problem is but one of those inherent in advancing civilization. The increasing demands upon our highways from a growing population, the development of new uses, the imposition of modes of transportation not contemplated when they were created, have brought about congestion, confusion and conflict, until the yearly toll of traffic accidents has reached an appalling total. If the death and disaster that now fall upon innocent people, through the year and over our country as a whole, were concentrated into one calamity we would shudder at the tremendous catastrophe. The loss is no less disastrous because diffused in time and space. The evil you are combating is so widespread as to be of national concern, and we do well to look at it with a country-wide vision. But its solution does not rest in national action. Highway control is primarily for the states, and it is best that this is so.

We cannot regulate local traffic by act of Congress. Means to overcome the difficulties, to keep our complex traffic moving with order and safety, must be found by the states. It is a proper function of federal authority to mobilize the best experience in each part of the country that it may be applied elsewhere, to the end that rules may be wise and uniform. But uniformity, while of the greatest value and highly advisable, so far as shifting local requirements will permit, should not be imposed by the inflexible fiat of central power. Rather, it should come from the common desire of the states to give the highest protection to their people, to regulate traffic in the most efficient manner, with final realization in the attainment of a common standard of perfection.

This is the high ideal toward which you are striving and your task is the finding and suggesting of methods of accomplishment. You have already done much by impressing upon the minds of our people knowledge of the terrible toll of traffic accidents. The further course of action and regulation will largely depend upon your recommendations. The undertaking is of supreme value, and you have my best wishes in your efforts.

sion having jurisdiction over the railways, which should also determine and enforce a proper division of the cost between the railroad and the public. These matters are of such importance and involve to such an extent the public safety as to require that priority be given to them in the allocation of capital funds by the railroad, over expenditures for other safety measures designed to protect the public.

Special traffic courts for handling violation of traffic laws should be established, both rural and city. No unlicensed person should be permitted to operate a motor vehicle, and before an operator's license is granted, the applicant's ability to operate a motor vehicle safely should be determined by ascertaining his physical and mental fitness, his knowledge of the laws and by actual demonstration. Such a license should not be granted to any person under 16 or unable to read.

Reckless driving and any other flagrant disregard of the rights of others by any user of the street or highway should be vigorously and unceasingly prosecuted. Adequate penalties should be provided, including the mandatory revocation of licenses for a specified length of time for cumulative evidence of carelessness or irresponsibility, or for operating a motor vehicle while under the influence of liquor or drugs, and severe penalties should be provided for driving during the period of suspension or revocation.

Regulation of speed of vehicles should be directed primarily at reckless driving and should be uniform throughout the country, as far as practicable. It should be unlawful to operate a vehicle at speeds greater than are reasonable and proper, having regard for the traffic and the use of the highway, or so as to endanger the life, limb or property of any person. The state law should prohibit any municipality from establishing a speed limit lower than 15 m.p.h. In rural areas, instead of an absolute speed limit, it should be provided that when any vehicle exceeds 35 m.p.h. that speed shall be *prima facie* unreasonable.

All states should adopt the principle of certification and registration of automobile titles as an effective means of reducing thefts and the accident hazards which go with them. Statutes should be passed in every state making it the specific business of some state agency to receive traffic accident reports and to investigate accidents, whether occurring in or beyond the corporate limits of municipalities. It should be made obligatory by law for those concerned to report traffic accidents involving serious personal injury or property damage.

Safety education should be incorporated in the curricula of all schools.

Administrative and Regulatory Principles

Under this general head, the report recommends uniformity with respect to all traffic regulations, and emphasizes the importance of careful statistics on street and highway accidents, urging their collection, publication and analysis in every state and community. A form of accident report is suggested, as is also the maintenance of spot maps as a means of detecting those points at which accidents occur most frequently.

Special regulation for the use of particular streets, such as the placing of automatic signs and signals, designation of arterial streets, restriction as to class of traffic, direction of traffic, parking privileges, etc., should be based upon competent traffic counts and analyses and established in accordance with some general plan of traffic movement founded upon the design of the street system in each city.

In congested centers where large volume of vehicular movement takes place between points considerably removed, the report suggests that an effort be made to segregate street cars, motor trucks and passenger automobiles on separate thoroughfares.

Under the heading of City Planning and Zoning, the report speaks of the fact that street hazards can be greatly reduced by a proper arrangement of streets and that each community should study its own special problems, with particular emphasis upon elimination of grade crossings with railway lines, classification of traffic with suitable facilities for each, location of traffic-originating centers so as to distribute them, and creation of by-pass highways and belt highways. Other subdivisions under the heading of city planning and zoning treat of day storage space for automobiles, design and equipment of streets, importance of sub-centers and satellites, relation between street facilities and development of private property, playgrounds and schools, inter-relation of traffic facilities, comprehensive traffic and thoroughfare plans.

Construction and Sign and Signal Standards

Under the heading of Street and Highway Construction, the report deals with roadway width and suggests that every pavement in a city street should be wide enough for at least three lanes of traffic without street cars or four lanes of traffic with street cars. These widths should be multiples of 9 ft. for motor vehicle lanes and 10 ft. for street cars. Right-of-way for parking space and for clear view at curves and intersections, provision for parking space, grades not to exceed 6 per cent, curves of not less than 300-ft. radius on highways of primary importance, cross-section of the pavement and guard railing are other topics treated. A clear view of approaching vehicles for at least 300 ft. should be provided at all points on highways of this character. Every bridge on an improved highway should be least 22 ft. wide.

For signs and signals, both luminous and non-luminous, the conference adopted the following recommendations for color indication: Red for "Stop," green for "Proceed," yellow for "Caution" as at curves; some special cautionary indication at crossroads; white letters or symbols to be used on the red or green background and black on yellow. Distance and direction signs should be black and white.

Railroad crossings remaining at grade should be safeguarded in every reasonable way. Standard warning signs and pavement markings should be used to indicate the approach to all public railroad crossings. Where the volume of traffic requires it, additional protection should be afforded by the use of flagmen, gates or approved electric or mechanical devices. So far as pos-

sible, a clear view along the track in both directions from both sides should be maintained. Sharp curves, abrupt changes of grades, roughness in the pavement or other conditions at or near the track which tend to divert the attention of the motorist should be avoided. Spotting of cars near the highway so as to obstruct the view should be prohibited. Marking and lighting of highways was also treated under this section.

REQUIREMENTS OF THE MOTOR VEHICLE

Pending adoption by constituted authority of a code for standard braking ability, all motor vehicles should be capable of stopping by means of the service brake alone in a distance of not more than 50 ft. from a speed of 20 m.p.h. on a dry, smooth, hard-surfaced road free from any loose material. The emergency brake should be capable of the same performance. Lost motion or play in the steering gear should be limited to about 15 deg. The toe-in of front wheels should never exceed § in. Clear red should be used for tail-lights and the rear aspect of parking lights, and it should be prohibited for any other exterior lights on the car. Clear yellow should be used for stop lights. The location of spot lights should be limited to the right of the vertical center line of the vehicle and the beam of the spot light should never be directed to the left of the vertical center line. Design of bodies and cabs should be carried out with due regard to the necessity of reducing to a minimum the shut-off area of driver vision. The use of posters or any other obstruction to vision on the front windows or on the windshield should be avoided.

The over-all width of vehicle and load of any motor vehicle should be limited to 96 in. Loading beyond the rated capacity of any vehicle should be prohibited. Adequate and periodic inspection and proper adjustment and repair of motor vehicles are absolutely essential. To this end there should be prepared a simple and practical inspection chart applicable to all makes of motor vehicles, giving particular attention to items affecting safety, for distribution by the Department of Commerce. Public service commissions and other public bodies having control of common carriers operating motor vehicles should establish reports and methods of supervision to insure adequate inspection and upkeep.

Under the heading of Conduct of Drivers and Pedestrians, rules of the road, passing, parking and stopping, hand signals and courtesy are all treated. A single cautionary signal, made by extending the arm well outside the vehicle, is recommended as the one and only signal to be used by the operator of an automobile or motor vehicle about to turn, slow down, stop or back. This is recommended as preferable to a code which attempts to show more exactly what the operator intends to do. A speed exceeding 15 m.p.h. on approaching within 100 ft. of any railroad crossing should not be permitted at crossings where the full stop is not required by law. The use of badly worn tires, especially on the front wheels, should be avoided as a positive source of danger.

The report recommends that education in safety and accident prevention should be incorporated in the curriculum of elementary schools by various means which are enumerated. It deals at some length with suggestions for co-operative work among various associations, unofficial organizations, manufacturers, insurance companies, automobile clubs and public agencies, operators of fleets of motor vehicles, and the schools and colleges. Suggestions are also made for safety education of the public.

Secretary Hoover made it plain that it is not his desire to set up a new permanent national organization devoted to safety.

The work of this initial conference will be followed up as effectively as possible, and it is probable that it will be called into session again one year from now, to determine how much has been accomplished, and to continue the general effort. Meantime, special phases of the problem will be given study by a few special voluntary committees of technical experts.

A New Conception of the Job*

Maintaining Street Railway Personnel Depends on Explaining Company's Purposes to Employees and Relation of Individual to Railway—Attitude of Employees Should Be Made Constructive and Conservative

BY S. F. FANNON
Director Department of Public Service, Sherman Service, Inc., Boston, Mass.

IN A MILL, plant or factory, the entire proposition is practically under one roof or at least under several roofs in close physical relation. All the factors are conveniently located and grouped so the management can keep its finger on the pulse from the moment raw material enters until the finished product goes out the other end of the plant. And yet such are the inherent difficulties that even under these favorable physical conditions the 100 per cent successful industrial plants are relatively very few.

In the street railway business you at once find the executive is confronted day and night by an infinitely more difficult situation, on which the following reasons will throw some light:

CONDITIONS DIFFERENT ON RAILWAY

1. His plant (machinery and equipment) is split up into as many unit plants as he has cars in operation.

2. His working force is also split up into as many unit forces as he has car crews in service.

3. Both his unit plants and unit forces are out of sight most of the time. This makes it practically impossible for him to keep his eye on plant or personnel as he could in any other industry.

4. It follows, therefore, that his men work largely without supervision of the kind that every industrial manager would consider essential.

5. Not only must his unit plants, which cost large sums and are subject to heavy depreciation if poorly handled, be intrusted to the care of the unsupervised employees who are charged with the duty of operating the cars, but he must depend on those unsupervised employees to perform a series of important duties, namely: His employee must (1) *manufacture* his product (which is transportation and service to the public); (2) *display* his product to his patrons; (3) *sell* his product to his patrons; (4) *deliver* his product to his patrons; and (5) even *collect* his money from his patrons and turn the receipts in at the cashier's office.

There seems to be no parallel in any other industry where such a demand is made on the loyalty and interest of the employee. Suppose a worker in a factory which manufactured autos, shoes, or any article or commodity were charged with duties similar to those of a street railway platform man. That factory worker would have to work without supervision to manufacture his product, then he would change his clothes and go out to display and sell his product. He would come back, change his clothes again, pack up and deliver his product. Then he would have to go back again to the customer and collect the bill for the product, so manufactured, so displayed, so sold and so delivered.

The executives of a street railway have a larger problem in employment than most executives. The platform man has to perform his duties under unusual conditions. He is obliged to stand on his feet a good percentage of the time; he must work night or day as the schedule demands, and may miss regular meals and have no regular hours with his family. He must be exposed more or less to the elements in all kinds of weather; he must work every day, week days, Sundays and holidays—he must work in contact with the public which represents the patrons of his employer, he must virtually represent his employer—the company—in fact he *is the company* to the average car rider. These are a few of the conditions that face the street railway executive of today.

You have been hearing a great deal in your various meetings and through your various journals about the maintenance and upkeep of your properties, shops, machines and rolling stock. You have heard of and know the importance of each in the railway business. They stand out in great prominence, but it is indisputable that in all lines of industry today the human factor is the controlling factor, and in the street railway business and on your property the human factor is by far the most important factor with which you have to deal. No matter how modern your equipment or how automatic your machine the successful operation of these devices rests en-

*Abstract of a paper before the New England Street Railway Club, Boston, Mass., Dec. 4, 1924.

tirely in the hands of the employee, actuated by various motives, because a motive, or an interest of some kind, is behind every act of every man.

A man's motives, more than anything else, determine his usefulness as an employee. Now let us make a scientific analysis of the employees in business today. We find in every business three kinds of motives, and consequently three kinds of employees. I don't mean three kinds of employees by race, sex, creed, language, craft or trade. In this, it makes no difference whether employees are skilled or unskilled labor, or where they work, or what they make.

We find the conservative employee, whose motives are constructive. We find the negative employee, whose motives are negative and reactionary. We find the neutral employee, whose motives are neither definitely for bad nor good.

Ten per Cent Conservative, Ten per Cent Discontented, Rest Neutral

The proportions into which we find a working force to be divided into these three kinds of employees will vary, naturally, but taking a thoroughly typical case, we find that 10 per cent are conservative, thoroughly contented with their employer and employment; another 10 per cent are negative, thoroughly discontented with their employer and employment; the remaining 80 per cent are neutrals, not contented as the conservatives are, not discontented as the radicals are, but indifferent.

We find that the conservative employee gives his employer a full day's work up to the limit of his skill. This means practically a 100 per cent return for the employer. We find that the negative employee gives his employer only 50 per cent or less of a full day's work. And we find that the neutral employee gives his employer 75 per cent of a full day's work. Now, you have always known that these three kinds of employees existed upon your property. You have always known the good employee who gives you a real full day's work and gives it willingly. You have seen his sunshiny face upon the platform of your cars. You have heard his pleasant "good morning." You have noted his assistance of the elderly on and off the car. You have heard his polite reply to numerous questions of the passengers. You have noted his close following of schedule, his interest in the upkeep of the car. He has time and again brought to you suggestions. This is the conservative, the man who is giving to you 100 per cent effort in return for the wages he draws. You have many times noted the man whose face carried the frown, whose very bearing spoke antagonism. He has no interest in carrying out the schedules. It is of no importance to him as to the appearance of his car or to the service he is rendering either the public or the company. This is the negative man—the man who is giving to you but 50 per cent of his ability. And again you have seen that great company of employees whose whole demeanor is that of unconcern. They seem to be saying, "Oh, what's the use, so many hours to put in, so many miles to travel. How soon will we be through?" They keep their eyes on the clock and go listlessly through the motions day after day with but a half interest in their work.

In the maintenance of the personnel in industry we have been very watchful as to the health of the employee. We are selecting with greater care each day the man whose mentality is strong. We are quite alert as to his morals. All these are important and are bound to aid in developing our employee's interest and satisfaction in his work. But do you not realize that the all-controlling power, the real force, is the employee's motives?

Does not the above analysis point out to you that we have another far more important step to take, the development of the motives of the neutral and negative employee to those of the conservative, the developing from this misunderstanding to understanding, from lack of interest in the job to real interest?

It is men we are dealing with, men made in the image of God, men upon whose shoulders rests the responsibility for the development of our civilization and nation. Dare we give to them less attention than we give to a machine? The machine is not working correctly. Do we leave the machine to run on giving under-production? Do we throw it to the scrap heap? No. We call upon the man who understands that machine. He analyzes and locates the trouble. But we do not stop there. We have him put that machine into such condition that it works properly, that it may give to us the desired capacity.

The employee must have brought to him in a tactful way, in a language that he understands, in a way that has a pull for him, the real facts about economics. He does not understand that 80 to 85 per cent of his entire output he buys back, and not only buys back but sets the price of the buying. He does not understand that it is not the number of dollars in his pay envelope that counts, but what the dollars will purchase. He must be told about his position, its opportunities and responsibilities. He must be led to understand the value of the town he is living in, why it is a good place for him and his family, to the meaning of liberty, the value of laws and the courts, the responsibility of citizenship.

Here is the problem that faces us today. It requires the most intimate knowledge of humanity. It is a challenge of the most scientific sort. But I am glad to be able to say that it is being accomplished. Skillfully, scientifically, through great study and deep research, scientists are leading the employees of various industrial organizations to a clear conception of their responsibility and obligation to a motive that puts interest into the job that is theirs to perform.

Eliminating Street Car Noises*

Numerous Sources of Noise on the Car Are Pointed Out and Remedial Measures Suggested for Each—A Higher Standard of Maintenance the Main Remedy

By R. W. Bailey
Superintendent Power and Equipment Kansas City Railways

SINCE the advent of the rubber-tired vehicle into the transportation field the noise emanating from metal wheel on metal rail, with the many contacts of metal to metal in trucks, brake rigging, etc., has become a source of annoyance. Noise is more or less a relative thing. Whether or not a thing is considered noisy is generally determined by comparison with other sounds. A car that would be considered extremely noisy today, ten years ago would have been considered a quiet running vehicle. With the clatter of the hoofs of horses, rolling of steel-tired wagon wheels over the street, etc., the noise from a street car was given very little consideration. Times have changed and something must be done to reduce the noise made by street cars.

The first question that confronts the mechanical department of the street railway today is the elimination of noise in the cars we are now operating. It must be remembered that many of these cars have been in service for from 5 to 20 years. In the design of this equipment very little attention, if any, was paid by the manufacturers to the elimination of noise. Metal to metal contacts, without any particular attention to close fits, make a condition that is hard to control. For instance, the present brake rigging on our cars consists of numerous floating parts joined together by pins and bolts. Our trucks, journal boxes and lids, springs and spring clips, air compressors, drawbars and attachments, motors and motor suspensions, gears and gear cases, door engines and step mechanisms, all body noises, and trolley bases and trolley wheel noises, all contribute more or less to the general noise made by the car. Last, but not by any means least, is the condition of the track over which the equipment is to operate. However, assuming that the track is in fair operating condition, with not more than the usual number of loose joints, corrugated rails, cup joints, etc., there are many parts of the equipment that can profitably be given increased attention. Just how far we can go in making cars quieter depends to a certain extent on the amount of money that is to be spent.

Wheel noises are largely due to vibration in the metal of the wheel itself. At a meeting of our mechanical men held recently two means of muffling this ringing were discussed. One method consisted of drilling additional holes in the web of the wheel and the other contemplated bolting oak blocks or pieces of lead plate to the web to deaden this ringing noise. We are attempting, with cast iron wheels, to produce the same results by putting a lead plate between

*Abstract of paper presented before meeting of Midwest Electric Railway Association, Nov. 24, 25, 1924, at St. Louis, Mo.

large washers and bolting onto the wheel. While this deadens the sound, it has not as yet been demonstrated that it is practicable. We are still following it up with great interest. Flat wheels are another source of disagreeable noise and if properly inspected and ground these can be practically eliminated. However, under certain conditions they are so frequent that the expense of properly removing the flats promptly is prohibitive and the wheels are allowed to continue in service.

A cushioned wheel is being manufactured and is now in service on steam railway inspection cars. Application of this construction to street cars would undoubtedly materially reduce the vibrations that are set up in the wheel and transmitted to the equipment. Just how far this would go to eliminate noise must be demonstrated, but it is worthy of serious consideration.

Journal Boxes and Brakes

Journal box noises originate from wheel impacts transmitted through the journals to journal box covers and such parts of the truck as make metal to metal contact. The wear plates on pedestals should be kept tight. Some types of journal boxes are also provided with plates that should be given the same attention. We have decided to do away with all spring lids on our present journal boxes and have devised a method whereby all lids are now bolted tight in place. We have also tried a few wooden lids to see what success we might have.

Brake noises are due in many instances to the fact that not enough attention is paid to the fit of the brake head and shoe. If a shoe is properly fitted to the brake head and properly keyed there should be very little noise at this point. Closer inspection as to the replacement of brake heads undoubtedly would eliminate considerable noise. Swinging brake beams, brake levers, equalizers and brake rods are another source of noise, and it seems that about the only proper thing to do is to maintain closer fits, taking care of pin wear and bushing renewals and making fits on clevices as close as possible, without binding the brakes. This is a matter that I think we have all overlooked more or less. Also, attention should be directed to seeing that brake rods are properly supported so that they will not be striking other equipment or the car body.

Trucks Contribute Also

Trucks that have not been well maintained and on which worn parts have not been replaced, generate noises at many points. The disagreeable noise made by motor gears is due primarily to the fact that we do not maintain close centers between gear and pinion. We have all been trying to get the longest life possible out of all types of bearings for purposes of economy, and noisy operation has been the result. Worn axle brasses, by permitting gears to mesh poorly, are thus one of the chief causes of noise. It may be because axle brass renewal already is one of the largest items of equipment maintenance cost that we tend to overlook the noise from this source. If axle brasses are removed before the gears become noisy the present limits of wear allowed will have to be decreased materially.

This question also involves serious consideration of gear cases. When properly installed they cause little noise, but when the gear is out of alignment or off center, the case acts as a sounding board to magnify these noises. Excessive lateral wear in armature and axle bearings will allow the gear or pinion to strike the case and it then becomes very noisy indeed. Proper lubrication of gears, in fact of all moving parts, is another important factor to be considered in connection with this subject.

Body noises originate from many causes and include a wide variety of squeaks and rattles resulting from service strains and from loose parts. The body and vestibule sash, body doors, register mechanism and many other fittings are the chief sources. Special attention should be given to keeping sash tight, as they are one source of particular annoyance. Also, many rattles can be removed by taking care of the fits of doors and their operating mechanism.

All of us, probably on account of the necessity for economy, have been giving more attention to our maintenance cost per car-mile than to the fact that the car is not as pleasing to the public as might be desired. Our first job, therefore, is to raise the standard of maintenance so as to eliminate noises resulting from loose or worn parts. After that the use of fiber and lead or other sound-deadening materials may be experimented with profitably.

In my opinion, noise reduction is a progressive problem, and if we are able to control what we now consider the loud and disagreeable noises in our equipment, other noises will become apparent and seem objectionable that at the present time are not giving us any concern. For instance, if all other noises were quieted, the noise of a compressor would probably be very objectionable. Also, the drumming reflected to the car roof from the trolley wheel would probably become objectionable. In other words, noises which are not taken into consideration at all at the present time eventually may become an annoyance. Consequently there is a big job ahead on our old equipment.

Modern Methods an Economic Factor in Car Maintenance*

By Henry S. Day
Manager Transportation Division, Westinghouse Electric & Manufacturing Company, Boston, Mass.

IN THE many discussions of modernization very little has been said of the need of equally modern methods of maintenance and the savings that could be accomplished by them. In what follows I am using the electric car as the dominating factor because all things on an electric railway start and finish at the car. The universally accepted method of discussing economies of operation is by comparison, and to this end I will quote costs and describe practices gathered from some 50 roads during the past 18 months.

On four roads, where operating conditions are similar, the total mechanical department cost per car per year was in round numbers: Road A, $866; Road B, $950; Road C, $1,200, and Road D, $1,800. On each of these roads the annual car-miles was practically the same, the cars and equipment were equivalent in weight and power and were built largely by the same manufacturers at approximately the same time. It is interesting to note that on Road A 60 per cent of the equipment was modern and on Road D there were practically no modern cars or equipment.

The Northern Texas Traction Company, which at the time of the Coffin award showed a maintenance cost per car-mile of 1.9 cents, was operating 85 per cent modern light-weight cars and the Eastern Massachusetts Street Railway, referred to as road A, which was operating with a cost of 3.5 cents per car-mile, had only 60 per cent of its cars of the modern light-weight type.

Road A, with a cost of $866 per car per year, has a definite and constructive overhaul program carried out strictly along modern lines, while road D, with a cost of $1,800 per car per year, has not overhauled its cars for 6 years. On road B, with a cost of $950 per car per year, the low cost was obtained almost entirely by modern methods of maintenance, as all passenger cars in service are of composite wood and steel double-truck type, the average weight being 42,000 lb.

It seems surprising that cars of the same type and weight, not infrequently built by the same car builder, equipped with the same motors and in equivalent service should cost some $900 more per year operating in one city than it did in another.

The road that was spending $1,800 per car per year had more than 300 cars in service. If this operator had gotten his cost down to $866 he would have saved more than $900 a year on each car. This would have reduced his mechanical department costs about $270,000 per year, and would have wiped out the operating deficit.

Figures obtained from nine roads showed that the average cost for material only on each road ranged from $22.08 to $63.04 per motor per year. The additional labor charges in the total cost of maintenance varied from 47 per cent to 73 per cent of the material cost.

On 10 roads the total cost of materials and parts for 17,469 motors was $410,272, or an average cost per motor per year of $23.48. With the labor added this makes the cost per motor around $50 per year. On these same roads the material only charged to car account for electrical equipment for

*Abstract of a paper before the New England Street Railway Club, Boston, Mass., Dec. 4, 1924.

four-motor cars, showed the cost per car per year to range from $113.42 to $268.18. These great discrepancies in cost at least hint that the maintenance methods employed lacked standardization or, if you please, modernization. To bear this out it is found that a gear, armature winding, bearing or other part has a much longer life on one road than another, although made by the same manufacturer out of the same material and put to work in the same service.

The question is frequently raised that local conditions create influences that cannot be controlled, particularly those of the weather and elements. We used to think that the worst thing that could happen was a snowstorm. This idea is becoming out of date, with a good many others. For example, in the past 5 years the average per cent of armatures in service rewound by the Montreal Tramways is 9.36. On this road the average motor performance per armature rewound in the 5-year period was 252,200 miles. On the basis of 36,000 miles per year an armature would go 7 years between windings. So if equipment is in good condition "local conditions" are not the factor in operating costs that they have been claimed to be.

Recently an association of equipment men published two reports, showing cost per 1,000 car-miles and miles per pull-in. The reports were gotten up to show the improvement brought about by the good work of the association, which apparently was very effective. The striking thing about these reports seemed to be that in a group of eight roads, the total mechanical department maintenance per 1,000 car-miles ranged from $18.43 to $38.13, and the total miles per pull-in from 6,189 to 46,062. It is also significant that the cost of operation on the road with the poorest showing in pull-ins was greater than on the road with the best showing. To continue the comparison, a road in New York state is operating motors with the original gears, gear cases and some of the pinions which were placed in city service 10 years ago, still in good condition. On this road, operating about 100 revenue cars, one man does all the winding, using only a part of his time. A road in Michigan rewound, last year, 125 per cent of the armatures in service.

Different Bases of Overhaul

Some roads inspect and overhaul on a mileage basis, some on a time basis, some on a watt-hour consumption basis. Others carry on inspection and overhaul by a system of light and heavy repairs as necessity dictates or equipment failures make compulsory. Overhaul periods on different roads vary from 15,000 miles or about 16 months between overhauls to 100,000 miles or about 33 months.

As a matter of fact any of the overhaul and inspection systems previously mentioned will keep cars in service with what is generally considered dependable operation. But it is also equally a matter of fact that but few of these methods keep cars in service economically when the possibilities of that economy are really analyzed.

Cars can be kept in service and maintained at low cost and with infrequent failures when new. Therefore, the system of inspection and overhaul that perpetuates the original condition, of course taking into account the yearly increasing age, is the one that will come closest to this standard and result in the lowest cost. A system like this will bring the cost of maintaining the average city street car down around $1,000 per year, with only approximately 5 per cent of the total cars out of service for overhaul, paint, collisions and running repairs. Today it is not unusual to find anything from 5 per cent to 25 per cent of the cars out of service for various reasons. The annual dead car hour cost is equal to a big sum.

The electric railway operator must come to the view point that constructive economy lies in higher standards and better methods, and that truly cheap maintenance means the care of rolling stock, power houses, line, and track along the lines intended by the engineer and manufacturer who was originally responsible for their production. That some operators have not done so, and have daily paid for it is evidenced by the very discrepancy in costs and operating records obtained from different roads. There seems no logical reason why two cars or equipment units made by the same manufacturer and placed in service at the same time in different places should at the end of a few years show widely varying results. Yet such is the case—neither can there be any question that the result is in direct ratio to the degree of skill and care exercised in the upkeep.

It is not unusual to find workmen with little training or skill and no comprehension of fits or close measurements, dismantling, repairing and assembling equipment and apparatus which had to be designed and built to what were practically micrometer specifications, in order successfully to meet operating conditions.

Modernization of methods of course means modern shops, tools and facilities. Baking ovens, spray painting, spray washing, large lye vats, power operated cranes and trucks, electric and gas welding, heat controlled babbitt pots, pneumatically or electrically operated hand tools are modern necessities. Light, comfortable shops, arranged to economize time and do away with hand labor will in themselves permit large economies. But these things alone will not reach the economies that can be attained by modernizing methods, which really mean constructive planning for and co-ordinating of the maintenance demands according to the character and requirements of the physical property. Higher standards and thorough execution of constructive maintenance schedules on a budget basis with an accurate method of tabulating costs backed up by engineering supervision and advice is another way of applying modernization of methods to any property.

For some reason hard to explain, this question of maintenance has never seemed to come into its own. The day isn't coming, but is already here, when reduced operating costs are going to decide to a large degree the question of profitable operation.

Quantity Production of Renewal Parts*

By H. R. Meyer
Westinghouse Electric & Manufacturing Company

AN ANALYSIS of several railway properties indicates that a careful study of maintenance methods with more thought given to the selection of renewal parts has been materially reflected in the earning capacity of these properties. Nine times out of ten the cost of the renewal part itself is only a relatively small percentage of the cost of replacement. The big costs are in the removal of the car from service and the labor cost.

A general survey of the renewal part production in this country will show that the great majority of electric railways manufacture their own renewal parts to a greater or lesser degree and the numerous independent manufacturing concerns are also engaged in this business, with the result that large quantity production is not practiced. Many electric railway men are of the belief that they can manufacture their renewal parts cheaper than they can buy them. In some instances this belief may be justified, but in the great majority of cases it is not supported by facts. Several companies which have made a close study of this subject have learned that it was a mistaken policy.

Manufacture of renewal parts by an operating company is entirely uneconomical from the standpoint of manufacturing standards as they exist today. The mechanical department of a street railway is fundamentally a maintenance organization. This organization is laid out on lines almost entirely foreign to that of a manufacturing company in that its work consists in the repair of apparatus rather than its design and fabrication. In some cases the plea is made that the use of maintenance men for manufacturing purposes is warranted on the basis that there are many occasions when some of these men have nothing to do. If this is actually the case, then there is room for improvement in the layout of the maintenance work. If the street railways had today a suitable system of cost accounting in the shops, we are firmly convinced the records would show that the cost of manufacturing is higher than the cost of the best material which can be bought on the market today.

On an average, the number of pieces of any one part is not large enough to warrant the setup required for the production of that part for one operating company. As the cost of the setup and handling operations must be included in the total cost of the job, each piece when a small number is involved must bear its share

*Abstract of a paper presented at the convention of the Pennsylvania Street Railway Association, Harrisburg, Dec. 5, 1924.

of this setup. This is too great a percentage of the total cost of the piece. In a plant which manufactures nothing but renewal parts for general maintenance consumption, the price of the unit can be based on large quantities, as the shop load for the particular part in question can be figured on the total number of completed pieces of apparatus in use throughout the country and not on just one property.

Have you ever considered the question of the proper tools required for manufacturing any part in quantities at a low cost? Each time another concern takes up the question of manufacturing a part which is already on the market, the cost of a new set of tools, jigs and fixtures is involved. This is a very uneconomical procedure and tends to keep the cost of a product up. Probably the most serious phase of this situation lies in the fact that as a rule the tool equipment is insufficient for an accurate reproduction of the renewal part. It stands to reason that to keep the cost down as few tools as possible are going to be made. This is not just a general statement but rather the result of many comparisons made between standard parts and those of other manufacture.

To manufacture renewal parts which will pass inspection as called for by the drawing information, the best of machinery equipment is required. A renewal part to give satisfactory service must be made to the exact dimensions of the part which it replaces. If this is not the case, the cost of a second replacement in labor alone would more than offset any saving which the home manufacture made. A survey of the street railways which was made a very short time ago showed that the average age of lathes now in service was twenty years. Manufacturing experience indicates clearly that close dimension work with duplication of parts cannot be obtained at low cost with such equipment. As the operation of the complete apparatus is dependent on the design and manufacture of the integral parts, it is evident that the tools for the renewal parts must be as near perfect as it is possible to obtain them. Only a good load factor will permit the investment for such tools.

The materials which go into a renewal part are of as much as if not more importance than the general appearance. Often is it possible to obtain at a low price reproductions of standard parts which resemble somewhat the high grade article. The question is, however, of what material is it compounded? The manufacturer of renewal parts should be constantly working toward the ultimate goal of perfection as it affects maintenance rather than that of first cost. To do this it is necessary to keep in touch with up-to-date research developments in materials and processes. A corps of trained engineers should be working on these problems at all times, testing all commercial products for the best and devising new methods of obtaining high quality materials when they are not available on the market. No materials should be used which do not come up to definite specifications laid down by these engineers. This service can only be available where the renewal parts receive only a very small proportional share of the expense.

When the operators manufacture their own parts, the materials for the fabrication are bought on price and hence are not necessarily of the best. An examination made of the materials used in a number of coils proved this point almost conclusively. Scrap materials for such items as bearings may be of almost any composition by the time they are cast, and hence the wall of the bearings may be brittle and coarse grained in structure, all of which tends to lessen their life.

As a rule, the men employed in the manufacture of renewal parts are inherently maintenance men. However, in many cases their time is split between the maintenance of equipment and the manufacture of parts. The supervisory force employed in the manufacture of renewal parts in most cases also has charge of the maintenance work. Does it not seem probable that under such conditions either one or the other of these two duties will suffer through this combination? The needs of an operating company in its maintenance work are so diversified and the quantities as a rule are so small that the support of a complete and separate manufacturing unit hardly seems justified.

The Question of Tolerance

Not so many years ago the question of tolerance on renewal parts as they affected the maintenance was one of seemingly minor importance. With the improved maintenance methods of today, and hence a greater appreciation of the necessity for correct tolerances, this question is of foremost importance in some of the major problems. You realize the importance of correct tolerances on your axles, wheel and gear bores because the effect of incorrect tolerances is immediately apparent in loose wheels and gears. This is not so true on many of the other parts of the equipment, as they will at least operate in some fashion. If you are subject to an epidemic of hot bearings and consequent troubles, you will become vitally interested in this question of tolerances and the effect when the improper ones are used.

Consider the question of brush-holders. The original manufacturer is very careful to see that the proper dimensions are adhered to from a consideration of neutral setting. If this question of neutral point of the motor is a vital one, then it is very necessary that all renewal part brush-holders be made to the same dimensions as the original. Unfortunately there are many renewal part brush holders in the manufacture of which this point is entirely neglected.

Probably in no way is the answer to tolerances so well exemplified as in the case of armature bearings and armature bearing housings. This particularly as it applies to change in gear center distances, overheated bearings and poling of armatures, with especial regard to lubrication. The life of a bearing shell is dependent to a very great extent on its fit in the housing. A loose fit of the bearing not only shortens its own life but makes necessary in many cases the reboring of the housing before a new bearing should be used. Noise in gears is mostly attributable to worn gears. However, a very large percentage of this noise is due to improper meshing caused by incorrect gear center distance. The wear of gears and pinions is increased by changes in gear center distances due to worn and improperly fitting parts. New gears and pinions under these conditions will be noisy.

Many renewal parts are made to drawing on which no tolerances whatsoever appear. Some of these drawings are made up by measuring parts for which, if tolerances were allowed, an error is bound to creep in.

Probably no one thing contributes more to the successful operation of a renewal part than the inspection which it receives before it leaves the point of manufacture. Adequate inspection of parts costs money, but it is just one of many things which must be done to service properly an operating company's requirements. Here again the load factor on any renewal part must be large enough so that each part will only have to bear a small proportion of the cost. If a clear conception of the importance of tolerance is conceded, then the importance of inspection is understood. This question of inspection is often neglected in the manufacture by operating companies.

In some cases it has been found that stocks of renewal parts exist in operating storerooms which far exceed the requirements for many years. This condition has been brought about by the necessity for making large quantities to keep the cost down. Quite a number of these parts are for apparatus which has become obsolete and therefore the remaining stock represents a total loss. The book value of this material and the interest loss is another factor which tends to offset any estimated gain through internal manufacture. When the manufacturer stands ready to protect your needs by local stocks at all times there is very little argument left for the operator to manufacture his own parts.

One large operating company estimates that by eliminating the manufacture of parts it will reduce its payroll by very nearly $100,000 per year. This does not mean a total saving of that amount, but a very, very good percentage of it will show up as a saving.

Indorses Better Business Methods

AT THE last meeting of the executive committee the policy committee was authorized to draw up a resolution indorsing the work of the Better Business Bureau and the National Vigilance Committee. The resolution follows:

"Recognizing the effectiveness of the work being done by the National Vigilance Committee and the Better Business Bureau in protecting the public against fraudulent, semi-fraudulent and hazardous investment propositions, this executive committee hereby indorses the work of both organizations. It urges member companies to support these organizations locally and nationally and to co-operate with them in whatever manner seems advisable."

American Association News

Arc Welding Discussed Before Metropolitan Section

A. G. BISSELL, arc-welding engineer of the Westinghouse Electric & Manufacturing Company, was the principal speaker at the meeting of the Metropolitan Section of the American Electric Railway Association in the auditorium of the Engineering Societies Building in New York on Dec. 12. His subject was the "Metallurgical Analysis of Electric Arc Welding" and he illustrated his remarks by means of lantern slides. He said that an electrode wire of hard drawn mild steel contains an average chemical composition of carbon, 0.16; manganese, 0.56; phosphorus, 0.032; sulphur, 0.024, and silicon, 0.016 with a tensile strength of 100,000 lb. per square inch. In passing through the arc, this metal in the molten and vaporized states comes in contact with the elements of the air, the extent of this contact being determined by the length of arc held by the operator. The shorter the arc, the less the metal is affected by the atmospheric elements. At the temperature of the arc the main elements of the air, oxygen and nitrogen, have a great affinity for the metals in the arc stream. The result of this affinity is that the nitrogen and oxygen combine with the elements of the wire to form oxides and nitrides. The carbon of the wire combines with the oxygen of the air to form carbon dioxide and carbon monoxide. Both of these compounds are gases and escape. The oxides of iron, manganese and silicon float to the surface of the molten metal as slag. The phosphorus and sulphur are altered but little. The nitrogen combines mainly with the iron. Some of each of the oxides and nitrides are scattered throughout the metal, but the extent of this is determined by the amount that is permitted to enter by the operator. An analysis of the metal after passing through the arc shows the following elements: Carbon, 0.05; manganese, 0.18; phosphorus, 0.031; sulphur, 0.036; silicon, 0.011; nitrogen, 0.114-0.138, and oxygen, 0.55-0.25 per cent. The tensile strength is from 55,000 to 62,000 lb. per square inch.

By holding the arc between $\frac{1}{8}$ in. and $\frac{5}{16}$ in. the arc stream is completely surrounded by an envelope, mainly of iron oxide vapor, that prevents the active oxygen and nitrogen on the outside from coming in contact with the active elements on the inside and permits a fairly pure metal to be deposited on the work.

By melting the steel wire and again solidifying it cast steel is produced, and at the same time the crystalline structure of the plate metal in the immediate vicinity of the deposit is altered. Photomicrographs show a section of metal extending from the added metal through the line of fusion into the plate in one layer. The light metal is of a cast structure. This is the deposited metal and consists of iron of the analysis given above. This structure blends into a different structure at the line of fusion between the plate metal and the deposited metal. The heat conducted through the plate away from the line of fusion produces structures corresponding to the temperatures reached. The dark, coarse structure is characteristic of an overheated steel and is brittle. This material extends about 0.015 in. into the plate. Further into the plate the grains grow smaller until the minimum size is reached at the point where true annealing occurs. Here the temperature reached is about 780 deg. C., or just above the critical point of the steel. The material at this point has a tensile strength of about 60,000 lb. per square inch and an elongation of about 25 to 30 per cent in 2 in. Further on the structure again coarsens, blending into the original structure of the plate. The crystals of each metal are perfectly enmeshed. The added metal may be identified by the inclusions of oxide and nitride that appear as black specks in it.

The principal discussion was by J. S. McWhirter of the Third Avenue Railway. The general opinion was expressed that electric railway operators had much to learn from the applications of arc welding carried out by the steam railroads.

Myles Lambert of the Westinghouse Company responded to the invitation of President Thompson of the section by addressing his remarks more particularly to the young men in the industry, and by making a plea for everybody engaged in electric railway work to do more to sell the industry to the public. Mr. Lambert said that the educational opportunities of the day were almost limitless and he urged all the men in the industry, particularly the younger men, not to leave any stones unturned in their efforts better to fit themselves for their jobs and for their work as citizens and as members of the community. He said that the interest of railway men everywhere was not only in the perfection of the physical apparatus with which they worked, but with the problem of studying how people regarded the service that was being rendered.

Secretary Hodges said there was a balance of $1,259.46 in the treasury and that since the last meeting the membership had increased 157, or from 569 to 726 members.

Mr. Thompson said that a broad program had been laid out for the year—one that he hoped would touch intimately the work of every man engaged in the industry. On each property included in the territory covered by the Metropolitan Section at least one man has been appointed who will keep in touch with the members in order to find out what subjects were uppermost in the minds of the men. In that way it could best be learned what the men desired to hear discussed.

May Singhi Breen and her Syncopators furnished the principal entertainment. They were roundly applauded. Miss Breen broadcast from Station WEBJ of the Third Avenue Railway, and the stage of the auditorium in the Engineering Building was equipped with a microphone and wires and announcements were made over the microphone to the invisible audience, but at the conclusion of the performance the announcer detached his instrument and darted off the stage while it was dawning on the audience that the broadcasting stunt was only a hoax.

Committee of 100 Disbands

ITS purpose accomplished, the Committee of 100, which was formed for the purpose of furthering the dissemination of correct information regarding the industry, will disband Jan. 1. Announcement to this effect was made in a letter sent by Gen. Guy E. Tripp, chairman, to each member of the committee. The letter follows in full:

"The Committee of 100, of which you are a member, will be dissolved on Jan. 1, 1925, on which date the American Electric Railway Association will take over its funds and work, and as chairman, I wish to take this opportunity to report to you what we have accomplished in the 5 years of our existence.

"The work for which the committee was originally organized, that of saving electric railways from seemingly imminent danger of general bankruptcy, by telling the public the facts about the industry, has been accomplished. Machinery for reaching the public with the industry's story was set up shortly after the organization of this committee, and this machinery has been perpetuated in its original form, enlarged and kept functioning under funds raised by the committee ever since.

"Initially, in 1919, the committee funds were expended in giving to the public facts developed by the Federal Electric Railways Commission, and such good results were accomplished by the publicity machinery then set up that it was transported to the American Electric Railway Association headquarters in New York, and since that time has functioned under the name of the Advertising Section of the association. Included in the beneficial accomplishments of this Advertising Section in the last four years are these:

" 'Established a point of contact between the electric railway industry and writers for newspapers, magazines, financial papers and other publications interested in electric railways through which they could obtain authorized information, including statistics, regarding the electric railway industry. This service, by its frank and honest dealing with publications, enjoys the highest standing and today is being utilized throughout the country.

" 'Encouraged electric railway companies to improve their public relations by frank dealing with the public, and caused the number of companies using publicity and advertising to increase during the 4-year period from about twenty to more than three hundred. The total amount of money now being spent for electric railway adver-

tising and publicity annually chiefly through local company channels is estimated at $3,000,000.

" 'Originated an advertising service for the dissemination through electric railway companies of posters, suggested newspaper advertisements, booklets, etc., carrying authenticated information about the industry. This service is supplied regularly to all electric railway companies in the United States.

" 'Aided in the organization of state companies on public utility information and arranged a co-operative arrangement with them whereby newspapers, state legislators, city officials and libraries and colleges in the 37 states where the committees operate are supplied regularly with electric railway material.

" 'Enlisted for the first time the co-operation of manufacturers of electric railway materials employing some 200,000 men in telling the facts about electric railways to the public.

" 'Made personal surveys of and gave national publicity to such outstanding electric railway situations as those which have arisen in Des Moines, Iowa; Okron, Ohio; Saginaw, Mich.; Toledo, Ohio, and Bridgeport, Conn., in which the bus sought to supplant electric cars.

" 'The Advertising Section has worked in close harmony with the executive committee of the A.E.R.A. and all of its activities have been carefully supervised by leading executives of the industry. The universal opinion of association executives familiar with the section's work is that it has accomplished effective results and that its efforts should continue along the general lines followed heretofore.'

"Happily, the finances of the association are in such condition that it is now able to carry on the educational work heretofore financed by the Committee of 100. Hence, the executive committee of the association on Nov. 21 officially made arrangements for financing the work after Jan. 1, 1925. Effective that date, therefore, the Committee of 100 will stand dissolved.

"Coincidentally, the executive committee adopted a resolution thanking the Committee of 100 for the excellent work that it has done since its creation. To this I wish to add a word of appreciation. This committee doubtless has been of great service to the industry, and I thank you personally for the assistance that you have rendered."

Heavy Traction

A MEETING of the heavy electric traction committee of the Engineering Association was held at association headquarters, New York City, on Dec. 17. Members present were J. C. Davidson, chairman; A. H. Armstrong, J. M. Bosenbury, H. F. Brown, Morris Buck, H. W. Cope, J. H. Davis, J. T. Hamilton, Norman Litchfield, J. O. Madison, L. S. Wells and C. R. Harte, sponsor.

Mr. Wells was appointed chairman of a sub-committee to review existing standards. It was suggested that a representative of this committee review the subject of zinc coatings for steel, now under consideration by a sectional committee of the American Engineering Standards Committee.

Mr. Brown, chairman of the sub-committee on revision of the bibliography of heavy electric traction, stated that the work has been carried out by Prof. Warner. This work is now nearly complete as regards American references. A motion was adopted that the American portion of the work be completed. The subject of collection of data on branch-line electrification and self-propelled cars was continued, with A. H. Armstrong as chairman of the sub-committee. The study of train operation, with particular reference to articulated trains, was referred to a sub-committee, with A. H. Daus as chairman. A sub-committee was appointed to check up and revise the tabulation of mileage, car and locomotive data of electrified steam railroads, with Mr. Cope as chairman.

Valuation

A MEETING of the committee on valuation of the American Association was held at association headquarters, New York, on Dec. 15 for the purpose of organizing and laying out the work for the coming year. Those present were F. W. Doolittle, New York, chairman; Francis Blossom, New York; H. A. Clarke, New York; W. F. Downs, Philadelphia; J. A. Emery, New York; T. E. Francis, St. Louis; C. W. Gillespie, New York; L. R. Nash, Boston, and A. S. Richey, Worcester, Mass.

It was decided to continue the work which the committee has been carrying on for several years in clarifying the status of valuation work. Several new subjects were proposed and discussed. Their inclusion in the program for the year was left to the discretion of the chairman. The next meeting will be held in connection with the Midyear Meeting at Washington.

Power Generation and Conversion

A MEETING of the committee on power generation and conversion was held at association headquarters, New York, on Dec. 15. Those present were L. D. Bale, chairman, Cleveland; C. E. Bennett, Atlanta, Ga.; W. E. Bryan, St. Louis, Mo.; C. A. Butcher, East Pittsburgh, Pa.; H. W. Codding, Newark, N. J.; H. T. Connolly, Annapolis, Md.; N. R. Love, Denver, Col.; F. W. Peters, Schenectady, N. Y., and V. H. Mueller, representing G. W. Saathoff, New York, N. Y.

Discussion centered on the various subjects which had been assigned to the committee for consideration and report during the coming year. Plans were outlined for carrying on the work, and four sub-committees were appointed. In regard to automatic substations, it was decided to review last year's report and add new information, and also to devise a classification to take care of substations manually operated all the time or part of the time and to include substations having semi-automatic and full automatic protection. The subject of remote supervisory control is to be studied with a view of obtaining additional data in regard to systems used for recording and indicating loads. New developments in supervisory control are to be considered.

A program was laid out in regard to the subject of ventilation and noiseless operation of substations. It was decided that test data in regard to ventilation as affecting temperature were desirable, and the committee decided to lay out a system of tests that should be made so as to collect data. The intention is to have some very complete tests made at various railway properties. It was considered desirable to obtain a steel bolt specification, and the committee is to go over the field and obtain specifications where possible, in order to make definite recommendations.

G. W. Saathoff was appointed chairman of the committee to study existing standards and also of the committee to obtain steel bolt specifications; H. W. Codding was appointed chairman of the committee on automatic substations, and F. W. Peters was appointed chairman of the committee on ventilation and noiseless operation of substations. W. E. Bryan is chairman of a special committee consisting of members of the power generation and conversion committees and the power transmission and distribution committees to study and codify power failures.

Power Transmission and Distribution

THE organization meeting of the power transmission and distribution committee of the Engineering Association was held at the Engineers Club, New York, on Dec. 15 and 16. The following subjects were assigned to sub-committees for consideration:

Concrete pole design, F. McVittie, chairman; block signals, J. M. Waldron, chairman; catenary overhead construction, A. Schlesinger, chairman; composition and wear of trolley wire, H. S. Murphy, chairman; temporary connections to trolley wire, J. F. Neild, chairman; overhead construction for trackless trolley, F. McVittie, chairman; return circuit, J. Walter Allen, chairman; review of Manual sections, Adrian Hughes, Jr., chairman. D. D. Ewing, J. F. Neild and A. Schlesinger were appointed to represent the committee on the joint inductive co-ordination investigation.

It was decided to hold a meeting of the committee at Chicago some time in March and a final meeting in New York at the call of the chairman.

The first day's session was given over to a general discussion of the subjects for the year, after which the main committee meeting adjourned and the various sub-committees met to outline their work specifically.

Those present were C. H. Jones, chairman; J. Walter Allen, S. M. Day, J. H. Drew, Charles Gilman, H. W. Griffin, C. J. Hixson, C. L. Hancock, H. W. Cooke, F. McVittie, H. S. Murphy, W. J. Quinn, W. Schaake, A. Schlesinger, J. M. Waldron, F. J. White, J. C. Damon representing W. H. Bassett, M. B. Rosevear, sponsor, and G. C. Hecker, special engineer.

The News of the Industry

Atlanta Traffic Study Presented

Expert's Report Contains Several Unusual Suggestions—Moving Platform Among Them

Removal of all street car tracks on Peachtree and Whitehall Streets between Ellis and Mitchell Streets in the downtown section of Atlanta, Ga., and the installation of moving underground platforms for the transportation of pedestrians at an approximate cost of $2,500,000 are two of the principal items in the report of John A. Beeler, New York, who has been engaged for the past six months in making a traffic survey of Atlanta at the joint request of the City Council and the Georgia Railway & Power Company.

Other recommendations include the erection of viaducts over the railroad tracks at both ends of the old Union station at Pryor Street and Central Avenue; the rerouting of practically every street car line in the city; the establishment of a co-ordinated coach system to eliminate the jitney problem by operating buses in connection with the street car system; the widening of several principal streets and the creation of alternate trolley and automobile boulevards.

While exact figures on the recommendations have not yet been made public, it is understood that it will cost $10,000,000 to carry out all the changes recommended. According to Mr. Beeler his recommendations will, if put into effect, take care of Atlanta's traffic problem for at least 30 years.

The most unusual feature of the recommendation is, of course, the proposed moving platform. The subway would be equipped with three continuous platforms. One set of platforms would run north on one side of the street and the other south on the opposite side. The inner walk would move at the rate of 6 m.p.h., the intermediate one at the rate of 4 m.p.h., and the outer one, or one nearest the stores, at the rate of 2 m.p.h.

According to Mr. Beeler it would be impracticable to widen either Peachtree or Whitehall Street. It is felt, however, that the elimination of the railway and the construction of the subway will not only solve the problem but will be a real advantage to merchants in the downtown section.

Mr. Beeler has also proposed the construction of alternate automobile and trolley boulevards. Present car lines would be rerouted on the adoption of this system, and the lines would go straight through town, some north and some south, looping in the suburbs to form a continuous system.

The four streets on which cars are to be operated would provide for one north and one south line on each of the principal thoroughfares, and this would do away with all of the loops, crossings and turnings in lines which make Atlanta's traffic situation a nightmare at present.

Another important recommendation is the operation of an auxiliary system of buses by the railway as the best means of meeting jitney competition. This section of the report contains a carefully worked-out plan for bus lines to supplement street-car lines.

The entire report is in eight sections. It includes recommendations on the moving sidewalk subway, the construction of the viaducts across the railway tracks, the creation of alternate automobile and street-car boulevards, the rerouting of car lines to form a simpler and more effective system, and the operation of bus lines to supplement street car lines and compete with jitney competition.

Business Will Be Improved by Reparations Settlement

Herbert Hoover and Owen D. Young Outline Results Expected from Adoption of Dawes Plan—Mr. Young Said Plan Could Not Have Been Adopted Without American Participation and Must Have American Co-operation to Succeed

COMMERCE will be restored, productivity increased and employment bettered as the result of the adoption of the Dawes reparations settlement. These results were predicted by Herbert Hoover, Secretary of Commerce, at a dinner held in New York City on Dec. 11 in honor of Owen D. Young, co-author and first administrator of the plan. This relief will apply not only to Germany, he said, but to the whole world.

The German reparations question had become one of the world's most dangerous inheritances from the war. The failure in its adjustment had poured an increasing stream of conflict into international life, carrying with it political jeopardy and economic demoralization. The wound to the present complex and intricate civilization was so deep and so vital that many had despaired lest statesmanship should be unequal to the task of curing the ills. Today there are many problems yet unsolved. None of them, however, is so dangerous as those that one by one have been met successfully in the six years since the armistice.

The payments provided in such settlements must find their substance from production and economic services rendered. These international obligations are huge burdens, but in the course of years burdens shrink as productivity grows. In a peaceful world international trade is doubled once in every score of years. It was contended that the world would break under the burdens of the Napoleonic wars, but about twenty years later they bore so lightly that their dangers were no longer discussed. The settlement to which Mr. Young contributed so much clears the atmosphere and the processes of industry and commerce will quickly provide strength to meet the burden, if the world keeps peace.

Manufacture and distribution on a vast scale, the foundation of present high standards of living, can be accomplished only through the development of great units of production, said Mr. Hoover. With their development have come innumerable problems of public relationship and public responsibility. A rapid evolution and perhaps a silent revolution are being witnessed to-day in the relationship of great business to the social system. The present struggle is to preserve the fundamental stimulus of action, of initiative, and competition, to hold open the avenues of opportunity. At the same time an effort is being made to gain the benefit of co-operative action. There is no greater responsibility than that imposed upon the headship of great industries, for from this leadership and vision must come not only great contributions to economic progress, but upon it depends the solution of the many social problems. Mr. Hoover said that Mr. Young has been the expression of this type of leadership.

The Dawes plan is strictly economic and has nothing military or political in it. This was emphasized by Mr. Young. He said the plan does not mean the completion of Europe's reconstruction. This is still in an initial stage. It begins to look, Mr. Young said, as if there were real hope of a new day in the world—a day in which human beings in all countries may live peacefully and develop and work and save. The plan could not have been created or adopted without America and it cannot succeed without the co-operation of the people of America. The agencies of American business must all co-operate in support of the plan. American men of commerce, industry, agriculture and finance must aid in the restoration of the credit and currencies of the principal commercial nations.

At one point in his speech, Mr. Young called for a definite foreign policy that would be free from "the

horseplay of domestic politics." He said that such a policy would advance the peace of the world. As an alternative he suggested putting the State Department in a non-partisan position so that all citizens, including senators, could speak and act on foreign policies, "free from thought of the charge of being traitor to the political party of their affiliation."

The dinner was arranged by a committee headed by A. C. Bedford, chairman of the Standard Oil Company of New Jersey. Mr. Young was congratulated by Secretary of Commerce Herbert Hoover, Richard F. Grant, president of the Chamber of Commerce of the United States, and by the Prime Ministers of Italy, Belgium, Great Britain and France. Mr. Young's achievements as ad interim Agent General of Reparations Payments were recognized by the French Republic, which invested him with the cross of a Commander of the Legion of Honor.

George W. Wickersham, formerly Attorney-General, presided at the dinner to Mr. Young. A telegram was received from President Coolidge in which he said:

> The commission's work is now recognized as a great contribution to re-established economic order in Europe and the distinguished part which Mr. Young bore has earned for him the gratitude of people on both sides of the Atlantic.

Vice-President-elect Charles G. Dawes also sent his congratulations. Secretary of State Hughes telephoned his tribute from Washington. The remarks made by Mr. Hughes were relayed to the diners through a radio loud speaker.

Newspaper Misapprehension Corrected

Chicago Surface Lines Points Out Differences Between Chicago and Philadelphia Fares in an Effort to Correct False Impression Created by Editorial Comment

READERS of the Chicago *Journal* were advised in an editorial in the issue of Dec. 9 "to go back and walk around," a quoted passage from *Service Talks*, published by the Philadelphia Rapid Transit Company, "before they can be expected to grasp it." The passage was the one referred to in the ELECTRIC RAILWAY JOURNAL for Dec. 13 in which Mitten management and the 5-cent fare were discussed. The Chicago *Journal* suggested to its readers that "the spectacle of a street car management actually fighting for lower fares instead of high ones impresses the local straphangers as something fantastic—too good to be true." As the Chicago paper saw it, "Mr. Mitten was actuated by shrewd common sense as well as by regard for public convenience in taking the stand he did" on the 5-cent fare. Furthermore, the Chicago *Journal* said that the aid of the car crews in Philadelphia had been enlisted to such an extent "that Philadelphia got the street car habit more than any other city on earth."

G. A. Richardson, vice-president of the Chicago Surface Lines, felt that the editorial unintentionally gave a wrong impression and was extremely unfair to his company and to the riding public of Chicago. Mr. Richardson, who was vice-president of the Philadelphia Rapid Transit Company from 1919 to 1922, accordingly wrote to the editor to explain the situation. Mr. Richardson said in part:

> What Mr. Mitten wanted, to use his own words, was "a straight 5-cent fare with the elimination of all free transfers and 3-cent exchanges." You praise Mr. Mitten for this and apparently recommend it for Chicago.
>
> The Chicago Surface Lines carried passengers last year at an average rate per ride of 3.88 cents. On the basis of a straight 5-cent fare, such as Mr. Mitten suggested, each passenger would have had to pay 5 cents every time he boarded a car, no transfers being issued. The earnings of the Surface Lines from passenger service last year amounted to $56,987,000. With the straight 5-cent fare which Mr. Mitten advocated for Philadelphia and which your editorial indicates would be welcome here, our gross earnings from this source, on the basis of total rides, would have been more than $71,285,000, or $14,000,000 more than we received, and as no transfers would have been required, we would have saved the cost of printing and handling them, amounting to about $200,000.
>
> Your editorial also conveys the impression that the Philadelphia properties are paying enormous wages to their men, wages having increased 151 per cent. The Chicago Surface Lines pays its trainmen 75 cents an hour. At present the Philadelphia properties are paying 65 cents an hour, but a wage increase to 70 cents has been granted beginning Jan. 1, 1925, and in order to pay this wage increase Mr. Mitten applied for and secured from the Public Service Commission an increase in fare from 7 cents to 8, with tokens at 7½ cents.
>
> You assert that Mr. Mitten opposed this last increase from 7 cents to 8 cents. On the contrary Mr. Mitten applied for the increase. In a letter to the Mayor of Philadelphia, July 21, 1924, he said: "Our present urgent need must therefore be now met by increasing the 7-cent cash, four-tickets-for-25-cents fare. A fare of 8 cents cash, two tickets for 15 cents is now required." A temporary order for the increase was issued by the commission on his plea and it was hastened by his assertion of an immediate emergency.
>
> You also say that the riding per inhabitant in Philadelphia is more than in any other city on earth. There evidently has been some confusion in these figures. The issue of Mr. Mitten's *Service Talks* of Dec. 5, 1924, quotes a statement from the Boston News Bureau showing 381 rides per inhabitant in Philadelphia for last year. The same statement credits Chicago with 286 rides per inhabitant last year. The Chicago figure does not include the elevated system, which when combined with the Surface Lines brings the riding habit up to 356. The Philadelphia figure covering both elevated and surface lines includes 56,420,521 3-cent transfers and a number of zone fares, which are duplicate rides, and also some joint rate passengers. The true figure for Philadelphia on a comparable basis with Chicago should be 341 as compared with 356 in this city.
>
> With the recent fare increase to 8 cents and tokens two for 15 cents, effective Sept. 25, 1924, the average fare per ride in Philadelphia in October was 5.40 cents. The average fare per ride on the Chicago Surface Lines is 3.88 cents.
>
> It should be remembered that under the zone system in Philadelphia to ride, for instance, from the business district to Doylestown, a distance of less than 25 miles, a passenger must go through seven zones and pay a total of 38 cents. In Chicago on the surface lines it is possible to ride 35 miles for one fare of 7 cents.
>
> It should also be remembered that it is impossible to transfer from one surface line to another in the downtown district in Philadelphia without paying a 3-cent transfer charge, and that in no case is a second transfer given. If one wants to transfer twice, the second time he must pay a full fare.
>
> In Chicago a universal transfer system is in effect with practically unlimited transfers so long as the passenger is traveling in the same general direction.

New York Transit Inquiry Under Way

Justice McAvoy on the morning of Dec. 15 opened the hearing on transit matters in New York authorized by Governor Smith as a result of charges of neglect lodged with him against the members of the Public Service Commission by Mayor Hylan. The first witness called was George McAneny, chairman of the commission. He was on the stand all the first day of the hearing.

The second day of the hearing the special counsel for the Mayor withdrew, as did also the corporation counsel and the other attorneys for the city. This they did as a protest against the ruling by Justice McAvoy that they would not be permitted to cross-examine witnesses or to conduct examination of witnesses in an effort to sustain the charges against the commissioners. Later counsel for Justice McAvoy explained that the proceeding was an inquiry and not a trial and he cited as precedent for the action the cases of the investigation of the insurance companies and other similar proceedings.

At the opening session serious charges were made against the Mayor by the commission through Mr. McAneny. These comprised a brief signed by the three transit commissioners which reviews transit history since 1913, and particularly since the creation of the commission. It brings twenty-six charges, all showing alleged neglect, obstruction or deceit on the part of Mayor Hylan. The charges are specific, even mathematical. They allege a constant and expensive blocking of construction by the Mayor—construction of subway lines and subway car facilities. The failure of the city to fulfill its contracts for new lines, storage yards and repair shops is alleged to have held up $35,000,000 worth of facilities. In referring to the operation of buses under the jurisdiction of the city administration the brief of the commission charged that in "instances large payments have been made by the private operators to persons possessing political influence, through whose intervention such permits for operation had been secured."

On Thursday Commissioner Leroy T. Harkness testified in connection with the reorganization of the Brooklyn Rapid Transit Company into the Brooklyn-Manhattan Transit Corporation. It was alleged that the commission failed to compel the B.-M. T. and the Interborough Rapid Transit companies, operators of the city-owned subways, to set aside a proper amount of money for depreciation as provided for by the dual contracts.

John H. Delaney, chairman of the city Board of Transportation and formerly Transit Construction Commissioner, was another witness on Thursday. He disputed the testimony of Mr. McAneny that the transit companies were prevented from giving better service because of a lack of yards and declared it was not necessary to furnish "bedrooms" for all the cars. He added that he never had taken this defense of lack of yard facilities very seriously.

Strike on I. T. S. Settled

400 Miles Interurban Tied Up Six Days—Closed Shop Accepted, but No Hourly Wage Increase

Service was resumed on the lines of the Illinois Traction System, Peoria, on Dec. 13 at 5 p. m., following a strike which lasted six days. The men returned to work after a vote at which they approved the action of the executive committee of the union in agreeing to a compromise of the issues. The strike affected about 400 miles of railway. No effort was made by the company to operate trains.

The company maintained a conciliatory attitude throughout the entire proceeding. Business and civic organizations in several cities served by the company were unsuccessful in trying to persuade the trainmen's organization to submit the matter to arbitration. The company reiterated its willingness to settle on the basis of one of the original three propositions or to arbitrate the entire matter after the men had returned to work. These proposals were met with refusal in each case.

Arbitration Provision Ignored

The committee representing the trainmen finally agreed to forego the demand for an increased wage. This left two points at issue—the closed shop and the question of time and one-half for overtime work. On the fifth day of the strike, a conference was again arranged by the trainmen's committee and officials of the Illinois Traction System, at which a tentative agreement was drawn up which included the provision that the trainmen drop their demand for increased wage but the company recognize the principle of the closed shop and agree to pay 10 cents an hour in addition to the regular pay for overtime work, and that in the future, pending negotiation and execution of a new contract, trainmen shall continue to work. This agreement, in the nature of a compromise on both sides, was referred back to the membership of the trainmen's organization for a referendum vote.

The strike followed action by the Amalgamated Association through its executive committee, issuing an order to the 350 motormen, conductors and brakemen employed to cease work at midnight on the morning of Dec. 7.

The contract under which the men had been working during the past year expired on Dec. 1. It provided for arbitration. Negotiations for a new contract began Nov. 26. The trainmen asked for an increase of 10 cents an hour in wages, a closed shop, time and one-half for overtime and a number of changes in the working conditions. The wage scale (in cents per hour) was as follows:

Motormen and conductors on freight runs	65
Motormen and conductors on sleeper runs	65
Passenger motormen and conductors promoted prior to Jan. 1, 1923	62½
Passenger motormen and conductors promoted after Jan. 1, 1923	60
Trainmen on branch lines	55 to 60

A nine-hour day prevailed in the passenger service and a ten-hour day in the freight service.

During the negotiations the company took the stand that business conditions and the financial situation in which the company found itself would not permit of a contract that would add to the expense of operation. The company also insisted that the committee of five men representing the trainmen be authorized to negotiate a contract.

The committee representing the men reported on Dec. 5 that the members of the trainmen's organization had taken a vote in favor of quitting work, if necessary, to uphold the demands of a new contract with increased pay and better working conditions. At the same time the committee notified the company that the men were ready to consider any offer the company saw fit to make, if made before midnight, Dec. 7.

A reply from the company on the morning of Dec. 6 followed in the shape of three different propositions:

1.—That the committee of five should have authority from the rank and file of our men to negotiate a new agreement; that pending such negotiations an agreement should be made continuing the last contract (except as to wages) until a new agreement should be made; that the wages finally agreed to should be retroactive to Dec. 1, 1924.

2.—While this company in its efforts to continue railway service in its territory has urgent need for reduced expenses and believes a new contract should carry with it lower costs, we are willing to co-operate to the extent of agreeing to the renewal of the recently expired contract for a period of from three to six months. This was later extended by the company to a full year.

3.—Believing that our position is fair and one that will stand honest examination we proposed that the committee and the company enter into an agreement to submit the entire matter to arbitration as arranged for in our last contract.

The trainmen's committee advised the company at 4 p.m. on Dec. 6 that none of the three propositions was acceptable and that unless the company agreed to the original demand by 10:00 p.m. the men would quit work at midnight. This was virtually a six-hour strike notice, taken by the committee without submitting the three company propositions to the members of the trainmen's organization for a referendum vote.

Track Changes Authorized in Mobile

Due to the fact that the Mobile Light & Railroad Company, Mobile, Ala., has been losing money for some time in railway operation, several changes in the trackage of its lines was allowed by the Alabama Public Service Commission at the meeting of that body held in Montgomery on Nov. 28.

The company was authorized to take up its track on the Wilkinson Street line and abandon service thereon. Permission was also granted to take up the tracks on old Government Street for a distance of three blocks. The commission's order also further provides that the company shall, in good faith, immediately take the necessary steps to operate cars over the Charleston-Beauregard and Cedar-Davis lines for the greater portion of the day on a 13-minute headway between cars.

The opinion of the commission was that when it was shown that a railway utility fails to earn a fair return on its investment, and such failure was not attributable to its fault, the utility should be allowed to make changes in its car tracks and rearrange and consolidate its service, if these changes would result in substantial reduction.

Resolution Urges Agreement on Cincinnati Loop

Fearing that continuation of a deadlock on the traction situation would jeopardize the success of the rapid transit loop of Cincinnati, Ohio, the Rapid Transit Commission passed a resolution, presented by E. W. Edwards, chairman, urging an early agreement with the city, the Cincinnati Traction Company and the Cincinnati Street Railway. In presenting the resolution Mr. Edwards stated that the time had come when it was necessary to negotiate a contract for the operation of the loop, in which $6,000,000 of the taxpayers' money had been invested. A large section of the loop would likely be ready for operation during the latter part of 1925, it was asserted.

Mr. Edwards stated that the commission had been led to believe that the controversy would have been adjusted long before now, so that there would be no obstacle in the way of making a contract for the loop. He also called attention to the fact that the car riding public, on the basis of the present rate of fare, was called upon to pay approximately $2,500,000 annually. If the controversy were taken into the courts, as the Mayor had threatened to do, the people would be deprived of the service of the loop for several years.

Baltimore Wage Increase Restores Peak of 1920

An increase of 2 per cent in the wages of its employees in operating departments was granted on Dec. 10 by the United Railways & Electric Company, Baltimore, Md. The increase, effective Jan. 1, will affect approximately 5,000 men.

The revised wage schedule briefly referred to in the ELECTRIC RAILWAY JOURNAL issue of Dec. 13, was announced at the annual meeting of company executives with representatives of the workers' organization, the United Railways Association of Baltimore. For platform men the increase will amount to about 1 cent an hour, making their minimum wage 47 cents an hour and the maximum 52 cents an hour, as compared with the present minimum of 46 cents and a maximum of 51 cents. The advance will add $155,000 to the company's annual payroll, officials said.

The wage question is but one feature of the working agreement under which the company and its employees operate, and the recent renewal of the agreement was the sixth since its inauguration.

An increase equivalent to the one just announced was granted last year. These increases restore wages to the peak point at which they stood in 1920, when 2 cents an hour was chopped off. They represent an increase of 18 cents since early in 1918, the last days of the 5-cent carfare.

Madison Company Files Increased Fare Petition

An application for an increase in fares to become effective Jan. 1 was made to the Wisconsin Railroad Commission on Dec. 5 by the Madison Railways, Madison. This application followed a meeting of a committee of the commission and the company which was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 6. The company asks for an average fare of 7 cents, although in previous meetings the plan of having an 8-cent cash fare with 17 tickets for $1 had been discussed.

The increase in fares is made necessary by the improvement plan which the company contemplates carrying out. In order to put through the present plan fully $700,000 is needed. Of this $700,000 it is estimated about $400,000 should be for replacement and $300,000 to capital account. Additional earnings of $80,000 are required for the completion of the program.

Part of the increase will be used to provide for an increase in the wages of the company's employees. It is planned to provide about $10,000 a year for this purpose. Several years ago the men accepted a wage cut of 3 cents an hour in order to keep the line in operation.

With an 8-cent cash fare and 17 tickets for $1 and taking into account the receipts of the company for last year, it was estimated that the additional revenues would range from $63,700 to $93,100, depending on the percentage of ticket sales. Last year the proportion of the gross receipts from cash fares was 60 per cent and that from tickets 40 per cent.

Cleveland Men Reject Stanley Offer

Motormen and conductors employed by the Cleveland Railway, Cleveland, Ohio, at a secret ballot box referendum, Dec. 18, voted down a proposition offered them by John J. Stanley, president of the company, as a means of terminating all differences existing between the company and the union. His offer included the following terms:

1. The term of the contract between the company and the union to be definitely fixed at five years and to extend from May 1, 1925, to April 30, 1930.

2. In case arbitration of grievances is continued, the appeal for arbitration must be taken from the decision of the general manager. In case grievances are still left to the president or vice-president for decision, this is to be final and not subject to the determination of a board of arbitration.

3. The scale of wages to be: 60, 63 and 65 cents per hour, with differentials as at present, from Jan. 1, 1925, to April 30, 1926.

4. The past records of all employees to be cleared as of Jan. 1, 1925.

This offer means a wage increase of 5 cents an hour to the men and makes definite for a period of five years the closed shop contract now existing for an indefinite period. Officials of the union agreed to submit Mr. Stanley's proposition to the men without recommendation on their part.

The Common Pleas Court some time ago threw out the award of a board of arbitration that granted the men a 12-cent an hour increase dating back to May 1 of this year. An appeal from this decision is now pending in the Court of Appeals. If the men accept Mr. Stanley's new offer, it means that the court action likely will be terminated.

Indicted Men in International Wreck to Stand Trial

Seven men who were indicted in January by the Niagara County grand jury in connection with the theft of dynamite alleged to have been used to destroy the Buffalo-Niagara Falls high-speed line of the International Railway at Ellwood Station on Aug. 14, 1922, will be placed on trial in Lockport on Dec. 22. Judge Charles Hickey of Niagara County has appointed Abner T. Hopkins as special attorney to prosecute the defendants, most of whom are former employees of the traction company.

Col. William J. Donovan, deputy attorney-general of the United States, who prosecuted the striking trainmen in the federal court at Buffalo, including former State Senator Robert Lacey, who pleaded guilty, will submit additional evidence in the dynamite case to the federal grand jury in Buffalo later this month. For more than a year Burns detectives and special agents of the United States Department of Justice have been investigating charges that high officials in the ranks of organized labor were responsible for the dynamiting. At least seven more indictments are rumored. Rewards totaling $100,000 are still offered by the International Railway for evidence in the case. Forty-two tourists were injured.

Providence Men Explain Wage Attitude

Union employees of the United Electric Railways, Providence, R. I., have explained in a letter recently delivered to E. J. Dickson, vice-president of the railway, their attitude on the wage controversy, especially on the manner of arbitration. The contents of the letter were not made known. The contract with the men expired on Oct. 31. Prior to that date the employees submitted a draft of a new wage and working agreement which called for a general increase amounting to 14 cents an hour. The present scale is 56, 59 and 61 cents. In a letter answering the demands of the union the company stated that in order to advance wages 14 cents an hour it would be necessary to raise the fare to 13 cents cash and suggested an agreement based upon a reduction of the wages of the platform men of 5 cents an hour or a rate of 56 cents. Following the rejection of this offer by the men the company made it clear that if arbitration were resorted to the award "should be determined upon the evidence presented by the company of its ability to pay a reduced scale, the present scale or an increased scale and such determination should be based upon the resources of the company as of Nov. 1, 1924." The demands of the men were referred to in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 18.

News Notes

Advance Plan for Westchester Construction.—The Westchester County Transit Commission has proposed a $150,000,000 plan for rapid transit construction providing through trains from Westchester to lower Manhattan. The scheme would abandon the Grand Central Terminal for suburban passenger service.

May Electrify Line.—The Pittsfield-Maysville branch of the Wabash Railroad will not be operated by that road after Dec. 31, the date on which its present contract with the county expires. Engineers of the Central Illinois Public Service Company, Springfield, Ill., have been inquiring into the possible use of electricity.

Teamed for Seventeen Years.—*Surface Service*, the magazine of the Chicago Surface Lines, is promoting a contest to determine what conductor and motorman have teamed up together longest. The contest began with a challenge from one pair who have worked together for 17 years. They are Conductor Charles Levighn, 33 years in the service, and Motorman Maurice O'Connell, an employee since 1881.

Utility Courses at Oregon University.—Another university to adopt the plan of offering courses of study in public utilities is the University of Oregon at Eugene, Ore. This course is similar to those adopted by such Eastern universities as Harvard, Pennsylvania, Northwestern, Illinois and others. The courses are offered to provide modern instructional work for men and women who are looking for careers in the industrial world.

Fare Hearing Continued. — The application of the Oklahoma Railway, Oklahoma City, Okla., for a 10-cent fare, set for Dec. 6, was deferred to Dec. 8 over the objection of the company. On Dec. 8 Mayor Cargill declared the city would encourage buses on all streets occupied by the company if the increase were granted. The commission continued the hearing to Jan. 16. John W. Shartel, president of the company, then declared justice delayed is justice denied and said the bondholders must protect themselves. Early action is, therefore, expected in the federal receivership case which is now pending.

Turnstiles in Use.—Two automatic turnstiles were put into operation at the Sixty-ninth Street Terminal of the Philadelphia Rapid Transit Company, Philadelphia, Pa., on Dec. 14 in order to determine the adaptability of this type of equipment to the Market Street subway-elevated system. Two different types of turnstiles are used. They can be operated by inserting a 7½-cent token and their use is expected to speed up the service materially by expediting the handling of passengers at this location. General use of the new car-fare carriers by elevated passengers, eliminating the necessity of frequent change-making, will work still further to the advantage of the company's patrons because of this new develop-

ment. One turnstile resembles the turnstile used by the Interborough Rapid Transit Company and the other that in use in the Brooklyn-Manhattan Transit Corporation's stations.

Seeks Amendment of Paving Obligations.—Anticipating renewed efforts at the coming session of the New Jersey Legislature to procure enactment of a law relieving street railways from the obligation to pave parts of streets in which they operate, Secretary Sedley H. Phinney of the State League of Municipalities has sent a communication to the New Jersey Board of Public Utility Commissioners asking that body to present to the Legislature a definite recommendation for modification of paving obligations. Mr. Phinney said that municipalities would be substantial sufferers if such a measure as proposed at the last session were to become a law.

One-Man Cars for Night Service.—One-man cars are planned by the Third Avenue Railway, New York, for its night service on its lines in Manhattan and the Bronx. The extent of the service with this type of equipment remains to be determined.

Wants One-Man Car Service.—The Boise Valley Traction Company, Boise, Idaho, has petitioned the Public Utilities Commission for permission to install one-man cars on the South Boise line. R. B. King, general manager of the railway, stated that unless such economy could be made, which would result in large savings in the cost of operation, the Boise Valley Traction Company would be forced to suspend business. He said further that on the South Boise line in 1920 there was a deficit of $4,255, in 1921 the deficit was $4,560, in 1922 it was $2,850 and in 1923 it was $4,589. For the first four months of the current year the line was running behind $1,088.

Early Morning and Owl Services.—The Grand Rapids Railway, Grand Rapids, Mich., has started an early morning service for the accommodation of factory workers. The service starts at 5:45 a.m. and is so routed as to enable men who formerly had to walk to work to go by street car. The service has been started on one route as an experiment. The plan will be extended to other lines as its success becomes apparent. It is also planned to re-establish owl service.

Ordinance Proposes Bus Lines.—Under an ordinance recently introduced by the City Council the Jacksonville Traction Company will be authorized to operate bus lines through the Riverside section, a portion of Jacksonville, Fla., not being served by street cars. The proposed line in this new territory will be between 4 and 5 miles in length and served by six buses charging a 10-cent fare. If the ordinance is adopted the company will purchase Birney safety type buses.

Paving Dispute Terminated.—The long controversy between the United Traction Company and the city of Albany as to the cost of the pavement of Western Avenue, on which the United Traction Company operates over a privately owned right-of-way, has been settled, it was announced by Mayor William S. Hackett of Albany on Nov. 19. The city of Albany will enter into an agreement with the United Traction Company whereby the latter will be granted a franchise extending over a period of years for the operation of trackless trolleys on Western Avenue, Allen Street, across Central Avenue and over Watervliet Avenue in return for feeing to the city the 33-ft. right-of-way in Western Avenue. Paving the deeded right-of-way will be started next spring, Mayor Hackett announced.

New Bus Lines Opened.—The Central Transportation Company, a subsidiary of the Trenton & Mercer County Transportation Company, Trenton, N. J., has opened up three new bus lines. One is running to Princeton and Kingston, a distance of 14 miles; another to Trenton Junction, 4 miles, and the third along the White Horse Road, 5 miles. The company has placed a luxurious motor coach in service between Trenton and Asbury Park.

"Service" as You Ride.—Every two weeks, on Saturday morning, the Indiana Service Company, Fort Wayne, Ind., places in its street cars and distributes to its employees a folder known as "Service." In the premier issue of this paper, under date of Sept. 27, the company announced that it was dedicated "To Your Daily Journey, which we are trying to make safer and more comfortable." The folder is a four-page sheet of convenient size containing some valuable information on city and interurban service and offering a few jokes as entertainment for its readers while they ride. The pamphlet invites criticisms along suggestive lines to bring about a better understanding between the company and its patrons.

Want Employees Protected.—Protection of employees of the Kansas City Railways, Kansas City, Mo., will be sought in the offering of $200 rewards by the receivers for conviction and arrest of reckless drivers. As it stands now, $200 will be paid for arrest and conviction of drivers of motor cars who injure or kill patrons of the railways while they are about to board, are leaving cars or are assembled in safety zones waiting for street cars.

Higher Bus Fees Proposed.—Higher license fees for buses and jitneys are proposed in an ordinance just introduced in the Indianapolis, Ind., City Council in which the maximum charge would be increased from $100 to $250 annually. The ordinance provides that bus companies should not be required to file a bond with the city, but provide insurance policies of $10,000 to $20,000, depending on the size of the bus.

Electric Line Will Supplant Steam Railroad.—The Chicago, Burlington & Quincy Railroad has asked the State Public Utilities Commission for permission to discontinue the operation of passenger trains between LaFayette and Denver. Instead it will operate two trains daily between Louisville and Lyons and then transfer passengers for Denver and intermediate points to the "Kite" Route, the electric railway operating between Denver and Boulder via Louisville. LaFayette is an intermediate point on the steam railroad Denver to Lyons. The suggested change would give the citizens two trains daily between Lyons and Denver, instead of one. The Chicago, Burlington & Quincy Railroad has been operating for years between Denver and Lyons, Colo.

Gives Up Claims Following Payment.—The municipality of Peoria, Ill., has accepted $17,000 in settlement of its paving assessment claims against the defunct Aurora, Plainfield & Joilet Electric line and bondholders' representatives relinquish all claims to the tangible assets within the city's limits. This portion of the plant is to be removed by the city, and it is expected this will settle the involved financial affairs of the defunct traction line. The city has had negotiations with the Northwest Utilities Company of Montana to operate cars over the line, but these were fruitless. Bus lines are expected to be authorized to supplant the suspended lines.

Considering Bus Lines.—The Wisconsin Public Service Corporation, Green Bay, Wis., has under consideration plans for the establishment of bus and motor truck rapid transit lines to radiate out of Green Bay to reach each of the principal cities and villages in northeastern Wisconsin. If carried out, the plan will require an initial investment of between $200,000 and $300,000 for rolling stock, depots and other equipment for this business. Complete data are being collected and examined by the company's transportation experts.

Bus from Lansing to St. Johns.—A permit has been granted the Michigan Electric Railway, Jackson, Mich., to operate a bus line from Lansing to St. Johns over a new paved road connecting the two cities. Application from Wilfred J. Richards to operate a bus line from Lansing to Jackson was refused on the showing of the railway, which contended that its present interurban service between the two points is sufficient to care for the traffic. The railway also sought a bus permit. It contended that if a permit was granted it should receive preference and be allowed to run the buses in connection with its interurbans. The commission decided that traffic was adequately provided for by the railway.

Side Signs in Knoxville.—All cars of the Knoxville Power & Light Company, Knoxville, Tenn., will in the near future be equipped with signs on the sides as well as the front and rear in deference to public requests.

Must Submit One-Man Car Data.—The Public Service Commission, under an order adopted at a session in New York Dec. 15 and served upon the International Railway, Buffalo, will give a hearing at the Buffalo office of the commission on Dec. 29 in the matter of one-man car operation in the city of Buffalo. The commission's order directs the company to submit testimony covering regulations, practices and equipment in respect to the operation of one-man cars; the lines operated as one-man car lines in the city of Buffalo; the number of cars operated and the headway maintained on each line; the number of passengers carried; the number of accidents which have occurred since Jan. 1, 1924, and the cause or causes of such accidents.

Financial and Corporate

New Reorganization Plan

$296,000 Will Be Provided Under the Revised Scheme for Massachusetts Interurban

A new plan, dated July 16, 1924, has been prepared and is being forwarded to security holders of the Boston & Worcester Street Railway and the holding company, the Boston & Worcester Electric Companies. More than 90 per cent of the first mortgage 4½ per cent bonds of the Boston & Worcester Street Railway due Aug. 1, 1923, were deposited under the plan of reorganization formulated when they matured, but it was felt that the bondholders did not make the required response.

In brief, the new plan provides for the exchange of $2,460,000 first 4½s, 1923, and $60,000 Framingham, Southborough & Marlborough Street Railway extended 7s, 1923, for new first mortgage 20-year bonds dated Aug. 1, 1924. Bondholders who subscribe $140 a bond for 10 shares of additional common stock will receive 6 per cent bonds in exchange for their present holdings, non-subscribing bondholders will receive 5 per cent bonds. This subscription right will be subject to the subscription privilege offered preferred shareholders of the Electric companies of subscribing for one share of railway common at $14 for each two shares of Electric companies preferred held. By these subscriptions $296,940 cash will be provided for improvements.

In addition to subscribing for common stock for cash the Electric companies will exchange $47,000 of notes and $60,000 of preferred stock of the railway for common stock of the latter par for par. The banks which hold $115,000 notes of the railway will accept 10-year 6 per cent income bonds. Preferred shareholders of the railway will waive accumulated dividends and exchange their stock for a new issue of 6 per cent preferred stock which will become cumulative upon retirement of the income debentures. Bondholders will receive accrued and unpaid interest on their bonds at 4½ per cent to Aug. 1, 1924.

It is said that upon completion of a study of operating conditions of the property now in progress it is possible that one or more branches may be abandoned, or buses substituted.

Portland, Ore., Will Sell Car Line

The city of Portland, Ore., has announced that on Jan. 15 City Treasurer Adams will sell to the highest bidder the Kings Heights car line, for delinquent assessments and taxes, amounting to $11,669, dating from Dec. 6, 1913. The line is operated by the Portland Electric Power Company as an accommodation to the people of the district, without franchise or title to the property, and is declared to be daily losing money. It is doubtful if the company will want to put in a bid.

The car line was built shortly after the city granted the franchise to the Heights Trust Company on July 28, 1910, to operate until Dec. 31, 1932. The franchise provided that connections be made with the lines of the Portland Electric Power Company and transfers be made over both lines. The Heights line is to pay the city $500 a year as a franchise fee, and the estimated cost of construction of the line at the time of granting the franchise was $20,000. The Heights Trust Company met financial reverses and the Portland Electric Power Company finally took over the operation of the line because many of its patrons of other lines lived on Kings Heights.

Two Chicago Appraisal Engineers Selected

Major R. F. Kelker, Jr., Chicago, an expert in the service of many big cities and formerly in the employ of the city of Chicago, and William J. Hagenah, Chicago, another engineer well known nationally, have been selected as two of the engineers to make a valuation of the surface lines there. Major Kelker was selected by the city and Mr. Hagenah by the bankers acting for the owners. They will jointly select the third member of the board.

Eight-Cent Fare at Denver Upheld by U. S. District Court

Valuation $23,514,769 for Rate Making—Additional Value of $2,000,000 for Perpetual Easements in Streets Excluded from Rate Base—Court Holds "Ordinarily, Reproduction Cost New Less Depreciation Is the Dominant Factor in a Present-Valuation Inquiry"

JUDGE ROBERT E. LEWIS of the District Court of the United States for the District of Colorado on Dec. 13, 1924, handed down a decision in the Denver Tramway valuation and rate of fare case. He fixed the value of the property for rate-making purposes at $23,514,769 and made permanent the present 8-cent cash fare (with 7½-cent ticket fare) and approved the 7½ per cent rate of return allowed by the special master in chancery.

This is the first large street railway to conduct a confiscation case originating in the United States court that necessitated the presentation *de novo* to the court of all details of inventory and valuation with detailed testimony as to the principles of valuation adopted with respect to the basis of reproduction costs, depreciation and the cost of development as measuring the going concern value of electric railway properties. Usually the valuations are fixed by the Public Service Commissions and reach the federal court only on appeal.

The decision disposes of four important items of controversy between the municipalities and the street railway companes and gives judicial interpretation to points that have been

COMPARATIVE VALUATIONS OF DENVER TRAMWAY

Valuation as fixed by decision of United States District Court compared with A. L. Drum & Company valuation as of Dec. 31, 1922, based on unit prices as of Dec. 31, 1922, after deducting items specifically excluded by master and with D. F. Wilcox valuation based on normal reproduction cost for the city of Denver.

	D. F. Wilcox, Normal Reproduction Cost	A. L. Drum & Company, Dec. 31, 1922, Valuation Less Items Excluded by Master	Decision of U. S. District Court
Land and right-of-way (exclusive of water rights)	$428,016	$1,107,024	$992,795
Track	2,906,544	5,347,255	5,121,715
Bridges	478,258	856,231	810,963
Paving	725,632	1,412,005	1,342,524
Electrical distribution system	776,691	1,075,769	1,054,316
Rolling stock	2,365,644	4,445,233	4,198,258
Power station equipment	746,504	1,598,098	1,504,809
Substation equipment	184,015	256,138	249,412
Shop equipment, tools, etc.	265,107	391,514	391,514
Buildings	1,520,361	2,510,803	2,356,000
Furniture and fixtures	82,584	174,716	144,918
Total inventoried property	$10,479,356	$19,174,786	$18,167,224
General stores	.....	507,599	507,599
Working capital	.....	239,394	239,394
Cost of franchise	.....	284,100	100,000
Engineering and superintendence	355,605	998,325	970,783
Administration, organization and legal expense	818,569	953,010	839,760
Taxes	54,175	325,220	325,220
Interest	343,554	2,669,165	1,664,889
Total physical property	$12,051,259	$25,151,599	$22,814,869
Accrued depreciation deducted	4,836,031	2,436,915	2,250,000
Physical property less depreciation	$7,215,228	$22,714,684	$20,564,869
Intangibles:			
Cost of financing	.....	1,301,455	.....
Water rights	.....	290,622	49,900
Going value	.....	4,000,000	2,900,000
Total value for rate making	$7,215,228	$28,306,761	$23,514,769
Value of right-of-way on streets under perpetual easement	.....	$2,000,000	$2,000,000

seized upon by the representatives of municipalities in order to depreciate and lower the values of traction properties.

The decision clearly establishes:

1. That great weight should be given to reproduction cost at present-day prices.
2. That a fair allowance for general overheads should be made.
3. That accrued depreciation should be deducted only to the extent actually found existing in the physical property, by the inspection of the property.
4. That a definite going value exists in a street railway property and must be included for rate-making purposes.

The decision on these four important items is especially clear. The court said:

Ordinarily, reproduction cost new less depreciation is the dominant factor in a present-valuation inquiry. S. W. Bell Telep. Co. vs. Pub. Serv. Comm., 262 U. S., 276; Bluefield Co. vs. Pub. Serv. Comm., 262 U. S., 679; Monroe Gas Light & Fuel Co. vs. Mich. Pub. Util. Comm., 292 Fed., 139; Van Wert Gas Light Co. vs. Pub. Util. Comm., 299 Fed., 670.

Accrued depreciation is a fact to be ascertained by inspection.

There remains to be added an amount for going concern value. . . . I am firmly of the notion that each of these witnesses knew much more than I do about what it would probably cost to put a skeleton street railway plant in successful operation. I am sure they each knew a great deal and I see no escape from accepting the lowest amount named in the testimony, $2,900,000, which, added, brings the valuation of the plant to $23,514,769.

ALLOWANCE FOR PERPETUAL EASEMENT

The court allowed additional value of $2,000,000 for perpetual easements or right-of-way in the streets under the Denver franchises of 1885 and 1888 as being property value. It stated:

No one doubts that the easements, whatever their duration or terms may be, are property, and property of value, and that they inhere in and are indispensable to the other property rights of the company. They lie in grants and are the foundation of all other rights. They are of such import, both to the company and the public, that, having been put in issue, I think their duration and value should be now adjudicated, though it be finally held, as the master held, that their value cannot be brought into the rate base. . . .

The terms used in both ordinances, 1885 and 1888, are appropriate to grants in perpetuity. There are no express limitations and no language is used from which an implication can arise that a less estate was intended than the general terms signify. The nature of the transaction, its purposes, its permanent character, and the investment required of the grantees repel an intention by either grantor or grantee that they were revocable licenses or easements at the will of the grantor, nor can any expression be found in either ordinance supporting a claim that the rights granted were to be for a term of years.

This comment has been interpreted to mean that in the event of condemnation for purchase of the property the company would be entitled to an allowance of $2,000,000 for the perpetual easements on the streets of Denver. The court, however, excluded this amount from the value for rate-making purposes.

The court sets forth at length in the decision the respective qualifications and practical experiences of Delos F. Wilcox, appraiser for the city of Denver, and A. L. Drum, valuation engineer for the Denver Tramway, stating as follows:

I think it clear beyond question that there was a total failure to qualify this witness (Delos F. Wilcox) as an expert and that it was error in matter of law to permit him to testify as an expert.

A tabulation published herewith gives by classified items a comparison of the values of the property as found by the court, A. L. Drum, representing the Denver Tramway, and Delos F. Wilcox, representing the city of Denver.

It will be recalled that Judge Dubbs as special master fixed the value of the property at $20,105,707. His findings in the case were reviewed at length in the issue of the ELECTRIC RAILWAY JOURNAL for Sept. 13, page 406. In his review of the case the special master said that the burden of proof was on the company.

Ohio Traction Company Stock Active

A rise of ten points in the preferred stock of the Ohio Traction Company, Cincinnati, Ohio, has taken place during the last three weeks. This activity is attributed to heavy purchases by Eastern capitalists. The Ohio Traction Company owns and controls the stock of the Cincinnati Traction Company, which operates the system under lease from the Cincinnati Street Railway. The company pays a dividend of 5 per cent. The heavy buying of the stock is attributed to the fact that the Ohio Traction Company has wiped out its indebtedness and now is in a position to resume the payment of dividends, which were discontinued in November, 1915. At that time the preferred was quoted at 55 on the Cincinnati Stock Exchange. Such well known New York brokerage firms as W. H. Harriman & Company have been buyers.

It was stated that if the traction interests and the city of Cincinnati were unable to reach an agreement over a new franchise, the Ohio Traction Company was willing to pay back franchise taxes from the time it started to raise fares above the level of 7½ cents. This would amount to $437,500, which would include the year of 1924 and the last quarter of 1923. In the event that the city is unable to effect an agreement with the traction interests before the advent of 1925 it is possible that the traction company will make a proposition to the city which will embody the payment of the back franchise tax and the keeping of fares at their present level, 10 cents. On the other hand, should the city take the matter into the courts this would involve long litigation, permitting the traction company to control the system for an indefinite period. At the present rate of fare the traction company would accumulate a surplus in the course of time, which would react to the benefit of the car rider.

New Personnel for Oklahoma Property

Officers of Albert Emanuel & Company, New York, N. Y., have been elected to the Pittsburg County Railway, McAlester, Okla., following the purchase some time ago of that property by the Emanuel interests. At the same time that the railway was taken over the Emanuel people took over the Choctaw Power & Light Company. These two properties are now included in the holdings of the Southwestern Power Company, which operates in the Oklahoma district. The new officers are as follows: President, Albert Emanuel; vice-president, Victor Emanuel; vice-president, general manager and head of purchasing department, G. W. Skow; secretary, Floyd H. Harper; treasurer, C. B. Zeigler; assistant treasurer, F. R. Merris; superintendent of railway, J. M. Putnam; district superintendent, H. B. Harris; chief engineer, H. T. Asbury; head of traffic department, A. R. Goodner, and chief engineer of the power plant, M. P. York.

The new owners of the property have proceeded with the work of rehabilitating the Pittsburg County Railway and have carried out important replacements and reconstruction. The road is in a territory that affords considerable freight and is said to be doing very well from the standpoint of the freight earnings. The line is 26 miles long.

Chicago Probably Leads Country in Riders per Capita

Detailed figures on car riding habit in the leading cities of the United States compiled by the Chicago Surface Lines place New York, Chicago and Philadelphia in the lead in that order on a basis of actual passengers carried. An explanation states that a division of the New York revenue passenger figures, if available, would reveal that many of the fares paid represent a duplication of the same person changing from one line to another where there is no transfer privilege.

The figures stand as follows:

No. of Rides per Capita Daily:	
New York	1.21
Chicago	1.03
Philadelphia	0.89

The Chicago figure is based on the United States census population of 2 936,605 and the following monthly revenue passengers:

Surface lines	70,543,501
Elevated	18,154,400
Motor coach	5,029,875
Total	93,727,776
Daily average revenue rides	3,023,476
Excess of rides per day over population	83,871

For New York, the revenue rides of the last calendar year, 2,623,793,713, were divided into a daily average of 7,188,475 as against a population of 5,927,625, showing an excess of rides over population of 1,260,850.

In Philadelphia the revenue rides, exclusive of 3-cent transfers, zone fares and joint rate passengers, was placed at 53,870,920 for October, a daily average of 1,737,771. The population, 1,951,076, used as a divisor, shows 0.89 of a ride per day per capita, or 213,305 fewer rides daily than population. In these figures, 160,000 population outside the city was included. The number of passengers was arrived at by subtracting 56,420,521 3-cent transfers. By counting in 3-cent transfers as separate revenue passengers, Philadelphia is placed in the lead in the "riding habit."

The figures were based on research directed by J. V. Sullivan, assistant to the vice-president of the Chicago Surface Lines. They are sponsored by Guy A. Richardson, vice-president and general manager of the Chicago Surface Lines.

$2,700,000 of P.R.T. Equipment Trust Certificates Offered

Dillon, Read & Company, New York, offered for subscription on Dec. 16 $2,700,000 of 5½ per cent equipment trust certificates of the Philadelphia Rapid Transit Company. The certificates mature serially from 1925 to 1934 and were priced to yield approximately 4.75 per cent to 5.50 per cent according to maturity.

The bankers explain that the certificates are to be issued by the trustee in part payment for new equipment consisting of 100 standard double-truck vestibuled cars, 125 double-deck motor coaches, 77 single-deck motor coaches and 11 motorized service units. This equipment will be constructed at a total cost of not less than $3,772,000. The par value of the certificates represent approximately 75 per cent of the cash cost of the railway cars and less than 70 per cent of the cash cost of the motor vehicles.

Raleigh Company Reorganized

The Carolina Power & Light Company, Raleigh, N. C., recently acquired by the J. G. White Company, has been reorganized. The following officers were elected: P. F. Henderson, president; W. W. Muckenfuss, secretary; M. H. Hendee, treasurer, and Harry Sudlow, manager. The board of directors is composed of P. F. Henderson, W. W. Muckenfuss and Charles J. Hill of Aiken, and George T. Jackson and F. B. Culley of North Augusta.

Toronto Purchase Price Finally Settled

Final settlement has been reached between the city of Toronto and the Toronto Street Railway regarding the purchase of the latter's properties by the municipality. The cost to the city is $13,679,242. The award of arbitrators, as finally settled by the Privy Council, was $11,483,500. Interest on this is $1,550,000 and legal charges $700,000.

$7,000,000 North Shore Issue Offered for Subscription

First and refunding mortgage bonds of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., to the amount of $7,000,000 were offered for public subscription on the morning of Dec. 19. The offering syndicate was headed by Halsey Stuart & Company, Inc., and the National City Company, New York. The bonds are dated Jan. 2, 1925, and are due Jan. 1, 1955. They carry 6 per cent interest and were offered at 98 and interest to yield 6.15 per cent. The present issue is known as series A. It is explained that the proceeds from the sale of the bonds will be used to refund $3,500,000 of one-year notes due June 15, 1925, issued in connection with the construction of the first section of the road to Waukegan, for the retirement of $2,721,700 additional principal amount of the company's refunded obligations, and for other corporate purposes. In the letter of the railway to the bankers giving the facts with respect to the purchase of the bonds by them the point is emphasized that the railway won the Coffin prize in 1923 awarded for its distinguished contribution to the electric railway industry. The bankers, in turn, call the attention of the investing public to this fact.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons there were sold this week 100 shares of Helena Light & Railway Company, Helena, Mont., preferred, $10 per share, and 20 shares of preferred, $15 a share. Also 250 shares Third Avenue Railroad, New York, $14 a share.

Approves Issue for Refinancing.—The Public Utilities Commission has approved the application of the Washington Railway & Electric Company, Washington, D. C., to issue $1,850,000 of its general and refunding mortgage 6 per cent 10-year gold bonds made a short time ago. The issue is for the purpose of refinancing the utility's obligations, specifically a loan of $1,850,000 of Metropolitan Railroad Company first mortgage 5s which mature on Feb. 1.

Bonds Offered.—A syndicate including E. H. Rollins & Sons is offering at 97 and accrued interest to yield more than 5.70 per cent $5,000,000 of the first and refunding mortgage 5½ per cent gold bonds of the Illinois Power & Light Corporation, Chicago, Ill. The bonds, known as series "B," are dated Dec. 1, 1924, and are due Dec. 1, 1954. The proceeds will be used to reimburse the treasury in part for expenditures on account of additions, extensions and improvements which have been made or are to be made to the properties and for the retirement of $157,500 underlying bonds.

Debenture Bonds Offered.—Bodell & Company, Providence, R. I., are offering at 91 and interest, yielding 6.70 per cent, $2,500,000 of the 30-year debenture gold bonds of the Federal Light & Traction Company, New York, N. Y. The bonds, known as Series "B," are dated Dec. 1, 1924, and are due Dec. 1, 1954. The proceeds of these debenture bonds will be used to retire any outstanding unconverted series "A" 7 per cent debentures which will be called for payment on March 1, 1925, and for extensions and improvements made or to be made to the properties of the operated companies.

Urged to Deposit Bonds.—The committee for the holders of first mortgage 6 per cent 10-year gold bonds of the Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan., has announced that the time for the deposit of the bonds expires Jan. 10 next. The bonds became due Aug. 1, 1924. There is now on deposit a majority of the bonds.

Asks Revaluation.—When the petition for an increase in rates on the line of the Richmond & Petersburg Interurban Railway came up before the State Corporation Commission, on Dec. 3, counsel for the citizens who are opposing the Virginia Railway & Power Company's application insisted on a revaluation of the interurban line. The commission heard the motion to revalue the property and gave both parties ten days in which to file briefs. The present fare from Richmond to Petersburg is 47 cents and the fare sought is 60 cents.

Shareholders Made Offer.—A committee has been formed for the purpose of arranging a sale of the preferred and common shares of the New Hampshire Electric Railways, Haverhill, Mass., and has received an offer of $32 per share for the preferred shares and $3 per share for the common shares. The offer has been accepted by the owners of upward of 50 per cent of each class of shares and the committee recommends the acceptance of the offer by all shareholders. The shareholders desirous of accepting the offer must deposit their shares on or before Jan. 5, 1925.

May Abandon Cars.—Manager Harding of the Columbus Electric & Power Company, Columbus, Ga., submitted a statement at a recent meeting of the directors of the Chamber of Commerce and asked for a public hearing on his plan to abandon the railway line which runs through Wynnton as far as Wildwood Park. His idea calls for the substitution of a bus route under the management of the Columbus Transportation Company. He believes that this operation will be more economical than extending existing railway lines.

Cars Cease to Operate in Oldest City.—The St. John's Electric Company has abandoned service in the city of St. Augustine, Fla., but will continue to operate the line to Anastasia, the company planning to commence on the work of rebuilding its line to St. Augustine Beach within a short time. The company has been operating at a loss for some time now, but an agreement could not be reached until the company said it would rebuild the line to the beach and assume certain obligations with regard to street improvements. The ordinance was published about a month ago and no restraining order being filed the company began the work of dismantling.

Gross and Net Earnings Decrease.—The revenue of the Barcelona Traction, Light & Power Company, Barcelona, Spain, for the year ended Dec. 31, 1923, was $2,726,973, according to the ninth annual report recently submitted to the board of directors. The administration and general expenses were $154,476. There was a balance of revenue available for interest on first mortgage bonds of $1,123,511. The balance carried to the balance sheet for the year was $21,985. In the report to the shareholders E. R. Peacock, president, said that the operating results of the tramway showed a decrease in gross earnings of 1.3 per cent and in net earnings of 7.8 per cent compared with the previous year.

Property Sold.—The Sheffield Company sold its electric railway at Sheffield, Ala., on Dec. 8 to the Alabama Power Company. The consideration was not announced, but was said to be about $3,000,000. The property will be taken over by the Alabama Power Company directly. The Sheffield Company owned and operated the interurban railway, which served Sheffield, Florence and Tuscumbia. It also owned the power plant which distributes light and power, and the water plant which supplies Sheffield and Tuscumbia.

Personal Items

Mr. Langan Advanced in Westinghouse Service

T. R. Langan, recently appointed manager of the transportation division in the New York office of the Westinghouse Electric & Manufacturing Company, formerly was manager of the transportation section in the Buffalo (New York) district with headquarters at Syracuse. In New York Mr. Langan succeeds A. J. Manson, recently promoted to the position of manager of the heavy traction division of the railway sales department at East Pittsburgh.

After taking courses at Pratt Institute, Brooklyn, and while taking night courses at Carnegie Institute of Technology, Pittsburgh, Mr. Langan entered the employ of the Westinghouse Company in 1904 as an armature winder's helper and wireman's helper in the service department. His work from 1904 to 1906 was in connection with the earlier installation of multiple-unit control equipments on the Brooklyn Elevated and New York subway. In 1906 he began the special apprenticeship course at the East Pittsburgh Works.

In 1908 Mr. Langan took up construction work in the service department. Later in that same year he was made assistant general foreman of maintenance on the electric division of the New York, New Haven & Hartford Railroad with headquarters at Stamford, Conn. In 1910 he was back again at East Pittsburgh on special service and engineering work in connection with the development of the present line of Westinghouse HL control and railway apparatus.

Mr. Langan entered the sales department in 1913 and began his selling career at Baltimore. He won success and recognition at once. From Baltimore he went to Philadelphia, then to Buffalo and later to Syracuse. His present move to New York places Mr. Langan in charge of the largest district office transportation division of the Westinghouse Company.

F. C. Pratt a Vice-President of General Electric

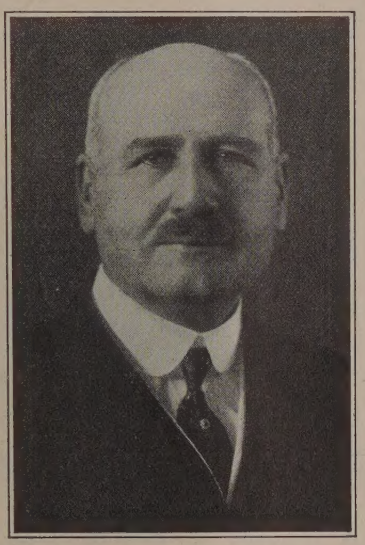
Francis C. Pratt, vice-president in charge of engineering of the General Electric Company, has been appointed to fill the vacancy caused by the resignation of G. E. Emmons as vice-president in charge of manufacturing and chairman of the manufacturing committee. Mr. Pratt's new title will be vice-president in charge of engineering and manufacturing.

In 1890 Mr. Pratt entered the plant of the Pratt & Whitney Company at Hartford, of which concern his father was president. He advanced to the vice-presidency and, in 1906, left to become associated with the General Electric Company as assistant to E. W. Rice, Jr. In 1912 he was appointed assistant to the president and in 1919 was elevated to the vice-presidency in charge of engineering. He was born in Hartford, Conn., Jan. 19, 1867. He was graduated with the degree of Ph.B. from the Sheffield Scientific School, Yale University, in 1888.

J. E. Hutcheson Honored

Montreal Tramways Manager Receives Recognition for Long and Able Service

Lieut.-Col. J. E. Hutcheson, recently elected vice-president of the Montreal Tramways, Montreal, Que., in addition to general manager, has been connected with that property since 1912. The new honors that thus have come to him are well merited. Colonel Hutcheson is a man of unusual ability and he has made a remarkable record in his handling of the operation of the tramway company. There have been several changes in the financial control of the tramway during the colonel's term of service with the property, but there has never been any question about his outstanding fitness for the post of manager, and now acknowledgment of his attainments in handling the property has come in his recent advancement to the vice-presidency of the company.



J. E. Hutcheson

Not the least of the achievements during his service as manager was the adoption of the service-at-cost plan. Some day, no doubt, the history of the negotiation of that agreement will be fully set forth, and it is unthinkable that Colonel Hutcheson's name will not be found written large in that work for the direct and indirect part which he took in helping to accomplish the passage of this measure. The terms of this contract are administered by a commission of three members, with whom the colonel has worked in close contact and with harmony. A measure of the success of the company under Colonel Hutcheson's direction is fortunately furnished by a recent offering of bonds of the company on a 5.45 per cent basis, in which it is divulged that the net earnings are more than 3½ times the annual bond interest charges. The colonel has also been in demand on numerous occasions to act in an advisory capacity in connection with the determination of railway and utility problems elsewhere.

Colonel Hutcheson entered the steam railway field in 1878 as a telegraph operator on the Grand Trunk Railway. In 1884 he joined the Canadian Pacific Railway as train dispatcher, and later became trainmaster and divisional superintendent. He left the service of the Canadian Pacific Railway in 1891 to take charge of the construction and later the management of the Ottawa Electric Railway. He remained in the service of that company until August, 1912, when he resigned to go to Montreal as general manager of the Montreal Tramways.

The colonel has had many years of service in the Canadian Militia, and for several years prior and during the great war served as a member of the committee on small arm development and manufacture in the Department of Militia and Defense. Despite his responsibilities he has not forgotten how to play. He is still very much the boy. He has always taken keen interest in military rifle shooting and was one of the leading rifle shots of the Dominion. He was a member of the Canadian Rifle Team which was sent to compete at Bisley, England, on several occasions and was adjutant and coach of the Canadian team in 1910. He was also a captain and coach of the Canadian Rifle Team that competed against teams from Great Britain, Australia and the United States for the Palma trophy in Ottawa in 1911.

Owen Young Suggested for Mayor of New York

Under the caption, "Another Job for You, Mr. Young," newspapers in New York City controlled by Frank Munsey carried on their front pages on Dec. 18 a summons to Owen D. Young, colleague of Brig.-Gen. Charles G. Dawes on the Dawes committee and later Agent-General of Reparation Payments, to permit himself to be drafted as a candidate for Mayor in next year's election. Mr. Munsey said that New York City, now grown so big, is an empire in itself and that it needed Mr. Young to reorganize it, quite as Europe needed him and General Dawes. Mr. Munsey said that Mr. Owen's part in the Dawes Plan and later as Agent-General of Reparations Payments gave the world an example of keen vision.

G. F. McKay has been elected secretary of the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md. He succeeds Thomas Mason, who also served as assistant to the president. J. A. Mellor has succeeded E. E. Polglase as master mechanic. E. A. Gannon is passenger agent and I. E. Ballard freight agent.

H. A. Johnson on Important New Work

Former President American Electric Railway Engineering Association Selected by Steam Railroads to Direct Exhaustive Investigation of Power Brakes

HARLEY A. JOHNSON, assistant to the general manager of the Chicago Rapid Transit Company and superintendent of shops and equipment of the Chicago, North Shore & Milwaukee Railroad, was appointed director of research of the American Railway Association, effective on Dec. 1, to take full charge of an extensive investigation of power brakes for both passenger and freight trains. Announcement of the appointment was made on Dec. 18. His selection to fill this very responsible post is a marked tribute to Mr. Johnson's ability and integrity as an engineer, and reflects credit on the electric railway industry as a whole and on the companies with which he has been associated continuously since graduation from Purdue University as a mechanical engineer in 1905. Credit to the Rapid Transit and the North Shore companies is further reflected by an agreement between the A.R.A. and President Britton I. Budd, under which Mr. Johnson will continue in his present capacity with those companies while at the same time directing this new work for the A.R.A.

WILL DIRECT RESEARCH

This appointment of a director of research for the A.R.A. is the outgrowth of a report by the Interstate Commerce Commission pointing out the necessity for improvement in power brakes for passenger and freight trains, and laying down certain requirements that should be met by such brake systems in the interests of public safety. The A.R.A. was directed by the commission to prepare tentative specifications for brake equipment which would fulfill these requirements, and be suitable as the basis for negotiations leading to the formation of approved specifications and a formal order covering their adoption.

This decision in favor of undertaking a thorough investigation of the entire subject of power brakes followed a finding by the A.R.A. to the effect that the general principles of satisfactory brake operation adopted by the commission were at variance with what the railroads after their exhaustive investigations and extensive experience had thought safe and desirable. As a result the committee on safety appliances felt a grave responsibility involved in any recommendations which might be made. It thereupon cast about for a man to head this extremely important work. In the words of R. M. Aishton, president A.R.A., the following is an outline of the scope of the task to be undertaken:

> The appointment of a director of research required the retention of a man who would be a competent and practical engineer, of unquestioned ability and integrity, without railroad or manufacturing affliation. The director will be empowered and authorized to take any action he deems necessary to enable him unqualifiedly to concur in the results of the tests, investigation and conclusions reached, such as surrounding himself if he so desires, with a staff of his own selection, sufficiently large and sufficiently competent to arrange for tests and so conduct them that every opportunity for criticism may be eliminated as to the decision having been influenced in any degree by railroads, manufacturers, patentees, or from any other source.
>
> The exisitng machinery of the Mechanical Division, American Railway Association (Safety Appliance Committee), will be prepared to act as an advisory committee to the director of research, if he so desires, and will arrange for the services of other existing committees, or the appointment of additional committees of the association as may be considered desirable by the director of research.
>
> The suggested scope of the work will include: investigation into the desirability and practicability of all designs and suggestions of possible merit in connecton with brake operation, giving special consideration to safety of operation through the incorporation of the apparatus so tested, of such functions as may be in existence or be suggested, that in the judgment of the director are worthy of consideration. This may, and probably will, necessitate the installation of a plant to test devices and functions under all possible conditions of service, in addition to technical tests, or may necessitate establishing on a single railroad, temporary service of a special character to enable the director to reach conclusions as to the effect on moving trains of any functio nsuggested that he desires to consider.

H. A. Johnson

In proposing Mr. Johnson to head this work, Mr. Aishton made the following statement:

> I don't know of anybody in the United States who is better fitted than Mr. Johnson to do a thorough job in a fearless way, from both a technical and practical standpoint, or who would so thoroughly cover every phase of the situation. His standing in the engineering and commercial field is beyond any question.

Mr. Johnson obtained some of his early experience in the steam road field. Previous to his graduation from Purdue University, he was employed at various times as draftsman, locomotive fireman, laboratory assistant and helper in the locomotive erecting shop of the Chicago, Burlington & Quincy Railroad. He entered the employ of the Metropolitan West Side Elevated Railway on Aug. 26, 1905, and has been with this company and its affiliated successor companies to the present time. He started at the bottom, as a helper in the repair shops on the maintenance of car equipment. He went into the drafting room in November, 1905, to engage in work on car design, traffic studies and maintenance of way. In April, 1907, he was made engineer of car equipment, and in December of the following year was promoted to master mechanic of the Metropolitan West Side Elevated Railway. When the four elevated roads in Chicago were placed under one operating management in 1911, his duties were extended to include these four roads. In 1915 his title was changed to superintendent of shops and equipment and in July, 1916, he was also appointed superintendent of shops and equipment on the Chicago, North Shore & Milwaukee Railroad, which was awarded the first Coffin prize during the year 1923.

Mr. Johnson was made organization engineer on the Chicago Elevated Railroads in March, 1920, and remained superintendent of shops and equipment of the Chicago, North Shore & Milwaukee Railroad. During this time he analyzed operating methods, costs, etc., and prepared statistical information which was used as the basis of recommendations for improvement of methods, practices or processes in all departments. Again inherent ability and unusual personality resulted in rapid promotion. In December, 1921, he was made assistant to the general manager of the Chicago Elevated Railroads, but remained superintendent of shops and equipment of the Chicago, North Shore & Milwaukee Railroad. In this capacity he continued to be responsible for the design and construction of all new rolling stock.

AN ANALYST OF GREAT ABILITY

Mr. Johnson's keen mind and breadth of vision were recognized by the companies with which he was associated, and he was repeatedly called upon to make extended investigations of other proprties for the purpose of bringing to the Rapid Transit Lines ideas for improvements in service suggested by the practices of others. In 1920 he accompanied the local transportation committee of the City Council of Chicago on a trip of inspection of the transportation facilities in a number of large cities in the country. In 1921 he was vice-chairman of a committee appointed by Samuel Insull to study the electrification of steam railroads in the United States and in this capacity traveled over approximately 95 per cent of the electrified steam railroad mileage in the country. In 1922 he was chairman of a committee of operating officials of the Chicago, North Shore & Milwaukee Railroad who visited the Pacific Coast and Texas cities to get ideas for improvements in service.

While president of the American Electric Railway Engineering Association, he, James W. Welsh, executive secretary of the association, and Harry L. Brown, editor ELECTRIC RAILWAY JOURNAL, were appointed as a special committee on foreign operations to investigate local transportation in England, Scotland, France and Switzerland. This committee submitted an extended report at the last convention, which was published in full in the ELECTRIC RAILWAY JOURNAL of Sept. 20, 1924.

Mr. Johnson is a member of the American Institute of Electrical Engineers, the Society of Automotive Engineers, Western Society of Engineers, American Electric Railway Association and the Western Railway Club.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Chicago "L" Orders 100 More De Luxe Cars

Comfort Features Embodied in an Earlier Group of Cars Have Been Retained in New Vehicles

To give additional service on the elevated lines, 100 new cars have been ordered this month by the Chicago Rapid Transit Company. In their design and equipment these cars will be similar to the group placed in service last winter and described in detail in the Jan. 12, 1924, issue of ELECTRIC RAILWAY JOURNAL. They will duplicate all of the de luxe features incorporated in the former cars, which have proved very popular with the riding public. A marked preference for this type of car has been noticeable on the part of passengers boarding the trains. The use of spring upholstered plush seats is considered to be an important factor in this popularity and will therefore be duplicated in the new cars. These will be built by the Cincinnati Car Company.

Interior trim, seating arrangements and heating devices will be the same as on the first group. With a view to making the cars as warm and soundproof as possible, the practice of using double wood floors is repeated. A ½-in. layer of compressed hair insulating material is laid between the steel underframe and the lower wood floor. On the previous group of cars this construction proved to be satisfactory from the standpoint of insulating the interior of the car from noise. Sound-insulating material is used also inside the side plates and above the headlining.

SUITABLE FOR SUBWAY OPERATION

In the design of all cars built for this company since 1914, the possibility of future subway operation has been borne in mind. When this group of 100 cars are delivered there will be a total of 455 steel cars suitable for subway operation. The details of the steel framing are very similar to the previous group and provision has again been made to allow a center door to be put in if desired. Four sliding doors, two in each end vestibule, are operated by National Pneumatic electro-pneumatic equipment, similar in design and construction to the type used before. The door control is arranged so that a guard between the two cars may control the adjacent doors in each car, or may take control of all four doors on each car, permitting a train to be operated with one guard for each two cars.

In accordance with previous practice, each car will be equipped with one motor truck and one trail truck, with two motors on the former. Trucks will be of Baldwin equalizing bar type. The motor trucks are equipped with 34-in. rolled steel wheels and the trailer trucks with 31-in. wheels. Motor and control equipment has not yet been decided upon.

The new cars will weigh approximately 75,000 lb. complete. This will be divided so that the car body with control equipment will weigh approximately 43,700 lb. and the trucks and motors will run 31,300 lb. Specifications are given in the accompanying table.

Number of cars ordered	100
Name of road	Chicago Rapid Transit Co.
Date of order	About Dec. 1
Date of delivery	Starting July 1, 1925
Builder of car body	Cincinnati Car Co.
Type of car	Elevated, passenger
Seating capacity	52
Weight	
Car body with control equipment	43,700 lb.
Trucks }	31,300 lb.
Equipment }	
Total	75,000 lb.
Bolster centers, length	33 ft. 8 in.
Length over all	48 ft. 0 in.
Truck wheelbase	
Motor	6 ft. 6 in.
Trailer	5 ft. 6 in.
Width over all	8 ft. 10 7/8 in.
Height, rail to trolley base	12 ft. 3 in.
Body	Steel
Interior trim	Mahogany
Headlining	Steel
Roof	Arch
Air brakes	Westinghouse AMU
Armature bearings	Plain
Axles	Heat-treated, Standard steel
Bumpers	Hedley anti-climbers
Car signal system	Conductor's hand bell
Car trimmings	Statuary bronze
Center and side bearings,	Stucki side, railway standard center
Conduits and junction boxes	Metallic
Couplers,	Automatic, Van Dorn and Stern & Ward
Curtain material	Double-faced Pantasote
Destination signs	Hunter
Door operating mechanism,	National Pneumatic electro-pneumatic
Hand brakes,	Blackhall handle and Peacock mechanism
Headlights	Crouse-Hinds portable
Journal boxes	Symington
Motors	Inside hung
Paint and varnish	Chicago Varnish
Seating material	Plush
Slack adjuster	Westinghouse Type J
Springs	Standard Steel Works
Trolley retrievers	Keystone
Trolley base	U. S.-13 F
Trucks	Baldwin equalizer
Ventilators	Railway Utility
Wheels	Rolled steel, 31 in. and 34 in.
Special devices, etc.	Rico coasting recorders, Rico No. 5 "Steelkar" straps

Extensive Program for 1925

The Grand Rapids Railway, Grand Rapids, Mich., is planning to spend nearly $750,000 on maintenance of way and new equipment in 1925. Approximately 11,179 ft. of double track will be reconstructed. This, together with the installation of considerable special trackwork, two railroad crossings and various other jobs, will cost $298,557.

Additional rolling stock which it is proposed to buy consists of 30 lightweight, double-truck cars to cost approximately $12,000 each and eight Fifth Avenue type J buses at approximately $7,000 each. Among the accessories included in the 1925 program are 50 Wood fare boxes, 27 Kuhlman type E slack adjusters and 11 U type automatic slack adjusters for Birney cars.

A portable Ingersoll-Rand air compressor will be purchased for the way department and also a steam-driven concrete mixer. For use as an emergency truck it is planned to buy a 3-ton truck chassis. Shop facilities will be improved by the installation of a thermostatically controlled babbitt pot, an oven for babbitting and a number of compressed air hoists.

Brill Gets Big Car Order

An order was placed this week with the J. G. Brill Company for 100 new cars for the Philadelphia Rapid Transit Company, Philadelphia, Pa. These will be of the single-end, front-entrance, center-exit type similar to the 385 cars ordered Jan. 22, 1923, and described in the ELECTRIC RAILWAY JOURNAL for March 10, 1923. One respect in which the new cars will differ from the first order is that they will be 3 in. longer, the added length being in front of the exit door. Delivery will commence in April, 1925. The cost of the cars will be in the neighborhood of $1,200,000, which, with the buses recently ordered by this company, will involve a total expenditure of nearly $4,000,000 for new rolling stock.

Uniformity of Details with Existing Motors Desired in New Designs

We hear so much of the advantages of new equipment that we are liable to assume that there are no disadvantages. One of the chief criticisms heard of new designs is in regard to the lack of interchangeability of parts with those of existing equipment. A recent order for car equipments specified a type of motor brought out 15 years ago. Inquiry as to the reason for this choice brought out the fact that this railway had but one type of motor, although it was operating 600 motor cars. The officials of this road considered that the advantages of uniformity outweighed improvements in design.

The large parts of railway motors such as frames and housings are seldom replaced and interchangeability

Metal, Coal and Material Prices

Metals—New York	Dec. 16, 1924
Copper, electrolytic, cents per lb	14.625
Copper wire base, cents per lb	16.875
Lead, cents per lb	9.30
Zinc, cents per lb	7.75
Tin, Straits, cents per lb	55.75
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.12½
Somerset mine run, Boston, net tons	2.125
Pittsburgh mine run, Pittsburgh, net tons	1.875
Franklin, Ill., screenings, Chicago, net tons	1.625
Central, Ill., screenings, Chicago, net tons	1.675
Kansas screenings, Kansas City, net tons	2.35
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$6.75
Weatherproof wire base, N.Y., cents per lb.	18.00
Cement, Chicago net prices, without bags	2.20
Linseed oil (5-lb. lots), N. Y., per gal	$1.16
White lead in oil (100-lb. keg), N. Y., cents per lb., carload lots	0.157
Turpentine (bbl. lots), N. Y., per gal	0.84

with existing equipment is not a particular advantage. But repair parts such as armature coils, commutators, brushes, brush holders, field coils, bearings, gears and pinions must be kept on hand in considerable quantities for replacements and any reduction in the number of types that must be carried in stock is a great help to the railway. Several railways have rehabilitated their motors so as to reduce the number of bearings that must be kept on hand, others have made wholesale changes in gear ratio so as to provide uniform gearing. These are things that could have been incorporated in the original design without decreasing the number of new and valuable features.

There are also a number of things that may be considered as auxiliaries to the motors that are affected by motor design. Some of these are motor suspensions, connectors for motor leads, lengths of motor leads and the position on the motor where they are brought out. Uniform arrangement of these details by the motor manufacturers will do much to reduce the number of parts that must be carried in stock and also repairs. Railway officials are anxious to have improved equipment, but there is a strong feeling among the men responsible for maintenance that much can be done toward securing greater uniformity of detail parts.

Rolling Stock

Black River Traction Company, Watertown, N. Y., is remodeling its old two-man cars into one-man pay-as-you-enter type for use in Watertown, Brownville and Dexter.

Detroit United Railway, Detroit, Mich., has ordered 100 buses instead of 75 as was at first planned. Ten of these single-deck buses have been loaned to the Wolverine Company for service between Detroit and Mount Clemens to replace antiquated equipment, and some of the first new buses to arrive are now on the Wyandotte-Trenton division. Buses and interurbans are being alternated as far as Farmington on that line.

San Antonio Public Service Company, San Antonio, Tex., has placed an order for two more Reo model W pay-enter buses having a seating capacity for 21 passengers each.

Track and Line

Tri-City Railway, Davenport, Iowa, is spending approximately $15,000 to reconstruct and lay new brick paving between its tracks on Second Avenue from Fifteenth Street to Seventeenth Street, according to an estimate made by T. C. Roderick, general manager.

East St. Louis, Caseyville & Eastern Railroad, East St. Louis, Ill., has been granted a franchise by the St. Clair, Ill., Board of Supervisors for an electric line between Caseyville, Ill., and Washington Park, a suburb of East St. Louis. A clause provides that construction must start within one year. This is a new incorporation referred to in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 18, 1924.

Harrisburg Railways, Harrisburg, Pa., has completed its program of track reconstruction for this year. This included the rebuilding of between 4 and 5 miles of single track at a cost of approximately $250,000. In general A. E. R. E. A. standard 7-in. grooved girder rail was used with bolted joints seam welded. On most of this work International twin steel ties were installed.

Chicago Surface Lines, Chicago, Ill., has extended the Belmont Avenue line from Cicero Avenue to Central Avenue.

Reading Transit & Light Company, Reading, Pa., in co-operation with the City Council and people of the northeast section has opened up a 3-mile electric railway known as the northeast loop to serve the residential section of the northeast. The line, constructed in four months, was built by the people of the territory which it serves. The company will operate the line under a 999-year lease.

Pittsburgh Railways, Pittsburgh, Pa., is laying new tracks and switches at Fifth Avenue, Grant and Diamond Streets in preparation for the short-looping of cars if the plan is given a trial.

Springfield Street Railway, Springfield, Mass., has expended about $40,000 in new track installations and other improvements at Elm Street and Park Avenue, West Springfield, preparatory to the opening of the new North End bridge across the Connecticut River. The company has also expended $15,000 on replacements and improvements at the intersection of Main and Lyman Streets in Springfield, near the site of the new Union Station.

Shops and Buildings

Philadelphia Rapid Transit Company, Philadelphia, Pa., has completed its carhouse on the block bounded by Twentieth, Johnson and Nineteenth Streets and Moyamensing Avenue. The finished terminal, which is modern in every respect, came within the estimated cost of $1,500,000. It has a capacity of 450 cars.

Birmingham Electric Company, Birmingham, Ala., will abandon the East Lake carhouse in a short time under a plan to centralize all existing railway repairs and storage operations in its Third Avenue carhouse. The reason for this movement is to increase the efficiency of the company, allowing the organization to maintain a smaller number of men in its shops department. Need of improvements at the East Lake carhouse and the paving of First Avenue are also factors in the move. J. S. Pevear, general manager, estimates that to equip the old carhouse would require an extra expenditure of about $40,000 in the paving project. Future use of the East Lake carhouse has not been definitely determined by company officials, but this property will not be sold at present.

Trade Notes

Johns-Manville, Inc., New York, N. Y., manufacturer of building materials, automotive equipment, asbestos specialties, fire extinguishers and electrical products, is to establish a factory in New Orleans. It has leased the building of the American Cotton Oil Company of Gretna. This has 50,000 sq.ft. of space under one roof, and is on a 5-acre site. The first unit will be in operation by April, it is announced.

Magnetic Signal Company, Los Angeles, Cal., has arranged with the General Railway Signal Company, Ltd., Montreal, to handle the magnetic flagman and accessories in the territory of Winnipeg and east thereof. Arrangements have also been completed with the Canadian Fairbanks-Morse Company of Vancouver, to act as agents for all the territory to the west of Winnipeg.

Conveyors Corporation of America, Chicago, Ill., announces the appointment of C. S. Price, First National Bank Building, Hazleton, Pa., as its district representative for northeastern Pennsylvania. Associated with Mr. Price in the sale of the American Steam Jet Ash Conveyor is E. E. Elliott, who has had wide experience in steam jet ash disposal engineering.

Glenn D. Evans has again joined the J. F. Buhr Machine Tool Company, Detroit, in the capacity of chief engineer. Mr. Evans has been chief engineer of the Climax Engineering Company of Los Angeles during the past three years.

New Advertising Literature

G. C. Kuhlman Car Company, Cleveland, Ohio has issued an illustrated booklet on the type G steel-frame bus bodies.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., in a publication called "Recent Developments in the Art," has recorded briefly some of the more important developments which this company has contributed to the electric railway industry during the past two years. This booklet was published for use as a guide reference in the Westinghouse booth at the A. E. R. A. convention last October, the new equipment or parts of equipment included in the exhibit having been marked with an orange star to indicate its newness, and the references in the book are similarly marked. The motive behind each development and advantages of its use over the previous part is briefly related for each subject covered. Another publication issued by the company describes the latest development in HL control, designed primarily for use on low-floor cars. Another leaflet contains application and performance data and construction details of the No. 333-V line of railway motors. An outline drawing with important dimensions is included. "The Trolley Bus—Its Application and Equipment" is the subject of the third leaflet.